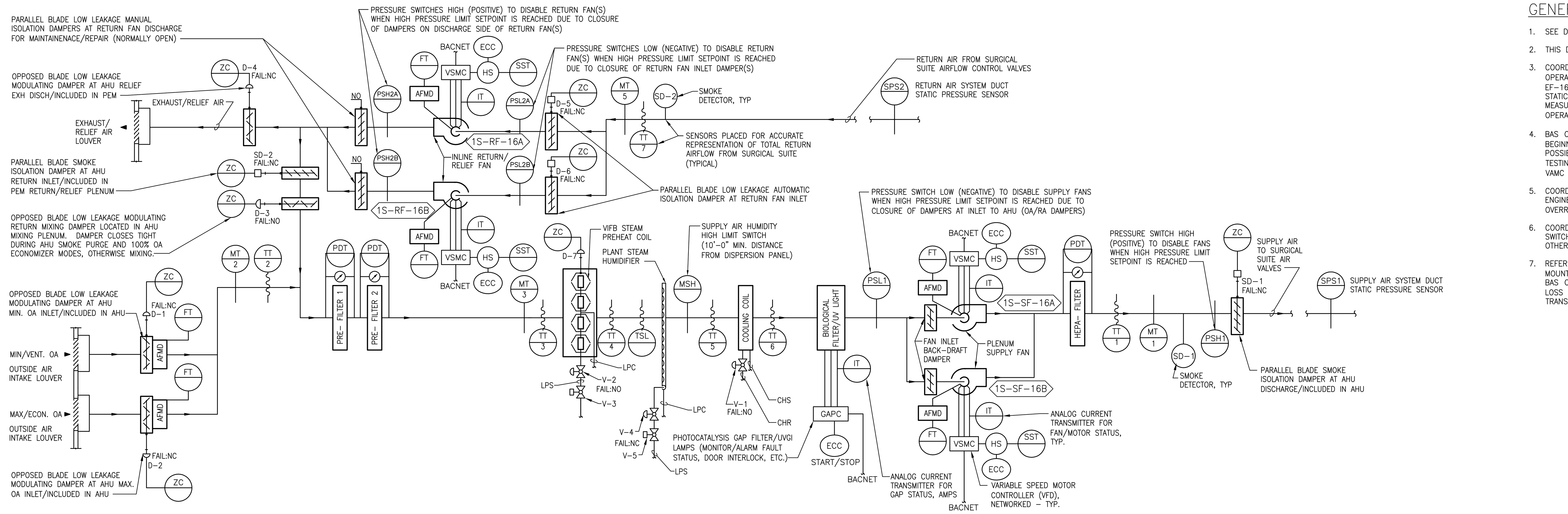


GENERAL SHEET NOTES:

1. SEE DWG. M0.01, M0.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE.
3. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP OPERATIONAL MODES. REVIEW AND CONFIRM ALL NEW AND EXISTING HVAC EQUIPMENT, (AC-8/EF-8, AC-9/RF-9, AC-10/EF-10, EF-16) AND THE ASSOCIATED EXISTING BAS CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED HEREIN. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING OUTDOOR AIR, SUPPLY, RETURN AND EXHAUST AIRFLOW MEASUREMENT AND OFFSET CONTROL VALUES FROM TOTAL SUPPLY AIRFLOW QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED.
4. BAS CONTRACTOR SHALL VERIFY AND DOCUMENT LOCATION OF ALL EXISTING TO REMAIN/RE-USED/RE-CALIBRATED SENSORS PRIOR TO BEGINNING OF PROJECT/DEMOLITION EFFORTS. REVIEW CONDITION OF THESE SENSING DEVICES AND SALVAGE/RESUSE/RECALIBRATE IF POSSIBLE, OTHERWISE REPLACE FOR NEW CONSTRUCTION AS REQUIRED. COORDINATE MOUNTING AND LOCATION OF ALL SENSORS WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC AS REQUIRED. IDENTIFY LOCATION ON PLANS/CONTROLS SUBMITTAL FOR VAMC RECORD DOCUMENTS/KNOWLEDGE AND INCLUDE WITH O&M SUBMISSION FOR CONTROLS AND SEQUENCES OF OPERATION.
5. COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED AND WARM-UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF ALL SPACE OCCUPANCY SENSORS AND THE DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN INDIVIDUALS SPACES AND/OR THE ENTIRE SUITE IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY.
6. COORDINATE FINAL LOCATIONS OF SPACE REFERENCE PRESSURE SENSOR, SPACE PRESSURIZATION MONITORING PANELS, KEYED-OVERRIDE SWITCHES, ROOM TEMPERATURE SENSORS, ROOM HUMIDITY SENSORS, OCCUPANCY SENSORS, UNOCCUPIED OVERRIDE PUSH BUTTONS AND OTHER WALL-MOUNTED CONTROLS DEVICES AS PER PLAN DRAWINGS, SPECIFICATIONS AND VAMC SITE ENGINEERING PERSONNEL REVIEW.
7. REFER TO ELECTRICAL PLANS AND COORDINATE POWER SOURCE FOR NEW HVAC EQUIPMENT AND EMERGENCY POWER SOURCE AND MOUNTING LOCATION FOR ALL BAS CONTROLS / CONTROL PANEL(S) AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR BAS CONTROL AND BAS TO REMAIN OPERATIONAL WHILE HVAC SYSTEMS SHUTDOWN DURING LOSS OF NORMAL POWER EVENT/EMERGENCY POWER OPERATION AND FOR HVAC EQUIPMENT TO RE-START AUTOMATICALLY DURING TRANSITION BACK TO NORMAL POWER.

1. GENERAL

1.1 UNIT (AC-16: SF-16A/16B, RF-16A/16B) IS NORMALLY STARTED AND STOPPED REMOTELY VIA THE BAS (BUILDING AUTOMATION SYSTEM). THE UNIT WILL NORMALLY OPERATE 24 HOURS/DAY WITH OCCUPIED, UNOCCUPIED, WARM-UP AND SMOKE PURGE MODES. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS "OFF" SD-1, SD-2, D-1, D-2, D-4, D-5 AND D-6, SHALL BE FULLY CLOSED. WHEN THE UNIT IS "ON" D-1, D-3, D-5, D-6, SD-1 AND SD-2 SHALL BE FULLY OPEN. WHEN NORMAL OCCUPIED MODE OR MORNING WARM-UP MODE IS ENGAGED, D1, D-2, D-3 AND D-4 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

2.1 SUPPLY AIR TEMPERATURE SETPOINT (AS SET BY BAS), SENSED BY SENSOR TT-1, SHALL BE MAINTAINED BY SEQUENCING THE COOLING COIL VALVE, V-1, AND HEATING VALVES, V-2/V-3, AS REQUIRED AND DESCRIBED HEREIN. HEATING AND COOLING CONTROL VALVES (V-1/V-2) SHALL BE MODULATED VIA PID CONTROL LOOP TO MAINTAIN THE SUPPLY AIR TEMP. TO PREVENT SIMULTANEOUS HEATING AND COOLING, CONTROL VALVES V-1 AND V-2 SHALL NOT BE ALLOWED TO OPEN SIMULTANEOUSLY (EXCEPT NORMALLY OPEN FAILURE POSITIONS). ON-OFF/STEAM BLOCKING VALVE, V-3, SHALL BE CLOSED UNTIL A CALL FOR HEATING IS ORIGINATED WITHIN THE AHU'S BAS CONTROLLER.

2.2 WHEN THE OUTSIDE AIR ENTHALPY, AS CALCULATED BY TT-2 AND MT-2, IS LOWER THAN THE RETURN AIR ENTHALPY, AS CALCULATED BY TT-7 AND MT-5, AND THE OUTSIDE AIR (OA) DRY BULB, TT-2, IS LESS THAN THE RETURN/EXHAUST DRY BULB, TT-7, THE UNIT ECONOMIZER MODE SHALL BE ENABLED. WHEN THE ECONOMIZER IS ENABLED, DAMPERS D-2, D-3, AND D-4 SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR SET-POINT AS SENSED BY THE DISCHARGE AIR TEMPERATURE SENSOR, TT-1. DURING 100% OA ECONOMIZER (OA BETWEEN 50-53 DEG F DRY BULB WITH MAX. 54 GR/LB MOISTURE), D-3 CLOSES FULLY, D-2/D-4 OPEN FULLY, AHU OPERATES AS 100% OA AHU.

2.3 WHEN THE OUTSIDE AIR ENTHALPY, OR TEMPERATURE, IS HIGHER THAN THE RETURN AIR ENTHALPY, OR RETURN TEMPERATURE, THE ECONOMIZER SHALL BE DISABLED, DAMPER D-2 SHALL FULLY CLOSE, DAMPER D3 SHALL FULLY OPEN, DAMPER D-1 SHALL MODULATE TO THE MINIMUM OUTSIDE AIR CFM SETPOINT AND DAMPER D4 SHALL MODULATE TO POSITION REQUIRED TO ATTAIN THE MINIMUM OA INTAKE. COORDINATE/CONFIRM TEMPERATURE CONTROL FOR ALL OPERATION MODES AND FOR ALL AHU/RETURN FAN AIRFLOW RATES AND DAMPER POSITIONS WITH TESTING, ADJUSTING & BALANCING (TAB) CONTRACTOR.

3. AIR FLOW CONTROL

3.1 THE BAS SHALL MODULATE THE SUPPLY FANS SPEED VIA THEIR ASSOCIATED VFD'S TO MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SET POINT. THE BAS SHALL CONTINUOUSLY COMPARE SUPPLY DUCT STATIC PRESSURE SENSORS (SPS-1) AND THE BAS SHALL CONTROL THE VFD'S TO MEET THE DUCT STATIC PRESSURE SENSOR WITH THE HIGHEST DEMAND.

3.2 IN THE EVENT OF A SUPPLY FAN FAILURE, THE AHU MANUFACTURER PROVIDED CONTROL PANEL SHALL DE-ENERGIZE THE FAILED FAN AND SEND AN ALARM TO THE BAS CONSOLE. THE AHU MANUFACTURER PROVIDED CONTROL PANEL SHALL RAMP UP THE REMAINING SUPPLY FAN TO ITS FULL CAPACITY TO ATTEMPT MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SET POINT UNTIL INSPECTION/REPAIR OF THE FAILED FAN CAN BE SCHEDULED BY VAMC. EACH SUPPLY FAN IS SIZED FOR 50% SYSTEM CAPACITY.

3.3 SUPPLY STATIC PRESSURE RESET: THE BAS SHALL DETERMINE THE MOST OPEN AIRFLOW CONTROL VALVE AT THE SYSTEM TERMINAL. SUPPLY UNITS (SAV). IF THE MOST OPEN SAV IS LESS THAN 90% OPEN, THE BAS SHALL RESET THE STATIC PRESSURE SET POINT DOWNWARD IN 0.1" WC INCREMENTS UNTIL THE MOST CLOSED SAV APPROACHES 95% OPEN. IF THE MOST OPEN AIRFLOW CONTROL VALVE EXCEEDS 95% OPEN, THE BAS SHALL RESET THE STATIC PRESSURE SET POINT UPWARD IN 0.1" WC INCREMENTS UNTIL THE SAV IS LESS THAN 95% OPEN.

3.4 THE BAS SHALL MODULATE THE RETURN FANS SPEED, VIA THEIR ASSOCIATED VFD'S TO MAINTAIN THE RETURN STATIC PRESSURE SET POINT (SPS-2).

3.5 IN THE EVENT OF A RETURN FAN FAILURE, THE BAS SHALL DE-ENERGIZE THE FAILED FAN, CLOSE ITS ASSOCIATED ISOLATION/SMOKE DAMPER, AND SEND AN ALARM TO THE BAS CONSOLE. THE AHU MANUFACTURER PROVIDED CONTROL PANEL SHALL RAMP UP THE REMAINING RETURN FAN TO ITS FULL CAPACITY TO ATTEMPT MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SET POINT UNTIL INSPECTION/REPAIR OF THE FAILED FAN CAN BE SCHEDULED BY VAMC. EACH RETURN FAN IS SIZED FOR 50% SYSTEM CAPACITY.

3.6 RETURN STATIC PRESSURE RESET: THE BAS SHALL DETERMINE THE MOST OPEN AIRFLOW CONTROL VALVE AT THE SYSTEM TERMINAL. RETURN UNITS (RAV). IF THE MOST OPEN RAV IS LESS THAN 90% OPEN, THE BAS SHALL RESET THE STATIC PRESSURE SET POINT UPWARD IN 0.1" WC INCREMENTS UNTIL THE MOST CLOSED RAV APPROACHES 95% OPEN. IF THE MOST OPEN AIRFLOW CONTROL VALVE EXCEEDS 95% OPEN, THE BAS SHALL RESET THE STATIC PRESSURE SET POINT DOWNWARD IN 0.1" WC INCREMENTS UNTIL THE MOST OPEN RAV IS LESS THAN 95% OPEN.

3.7 DURING UNOCCUPIED MODE AS DEFINED BY THE VAMC/COR AND COORDINATED WITH THE BAS CONTRACTOR AND TAB CONTRACTOR, THE BAS SHALL INDEX ALL AIRFLOW CONTROL VALVES TO THEIR UNOCCUPIED AIRFLOW SET POINTS (REFER TO ROOM SEQUENCES AND EQUIPMENT SCHEDULES FOR ADDITIONAL INFORMATION). THE SUPPLY AND RETURNS FANS SHALL CONTINUE TO OPERATE TO MAINTAIN SUPPLY AND RETURN DUCT STATIC PRESSURE (UNOCC). DESIGN INTENT IS FOR ONE SUPPLY FAN AND ONE RETURN FAN TO OPERATE AT THEIR RESPECTIVE MOST EFFICIENT POINTS DURING UNOCCUPIED MODE. THE TAB CONTRACTOR/BAS CONTRACTOR SHALL CONFIRM DURING FINAL TESTING AND BALANCING EFFORTS THAT UNOCCUPIED AIRFLOW QUANTITIES/STATIC PRESSURE REQUIREMENTS ARE SATISFIED/MAINTAINED.

3.8 THE BAS SHALL MONITOR THE SUPPLY AIR FLOW VIA AIR FLOW MEASURING STATIONS INSTALLED IN THE SUPPLY AIR FAN INLETS. THE BAS SHALL MONITOR THE RETURN AIR FLOW VIA AIR FLOW MEASURING STATIONS INSTALLED IN THE RETURN FAN INLETS. THE BAS SHALL MONITOR THE OUTDOOR AIRFLOW VIA COMBINATION OUTDOOR AIR INTAKE AIRFLOW MEASURING/DAMPER STATIONS AT THE OA INLET TO AC-16.

3.9 CONFIRM PLACEMENT / LOCATION OF NEW SUPPLY AIR AND RETURN AIR STATIC PRESSURE SENSORS WITHIN THE PEM MANIFOLD DUCTWORK BASED UPON TAB REVIEW AND INPUT AND THE ASSOCIATED STATIC PRESSURES REQUIRED TO MEET DESIGN SUPPLY AND RETURN/RELIEF AIRFLOW REQUIREMENTS. INDICATE SENSOR LOCATIONS ON RECORD DRAWING/PLAN FOR PRESENTATION TO OWNER / MAINTENANCE.

3.10 COORDINATE/CONFIRM ALL MODES OF OPERATION, ALL AHU/RETURN/RELIEF FAN AIRFLOW RATES, AL STATIC PRESSURES AND ALL DAMPER POSITIONS/FUNCTION WITH TESTING, ADJUSTING & BALANCING (TAB) CONTRACTOR. COORDINATE AHU SYSTEM OPERATION AND SWITCH-OVER BETWEEN MODES, INCLUDING OCCUPIED TO UNOCCUPIED, UNOCCUPIED OVERRIDE(VIA LOCAL PUSH-BUTTON AT NURSE STATION), UNOCCUPIED TO WARM-UP, WARM-UP TO OCCUPIED, AND SMOKE PURGE MODES AS DESCRIBED HEREIN.

4. INTERLOCKS AND SAFETIES

4.1 SUPPLY FANS (SF-16A/16B) SHALL BE SOFTWARE INTERLOCKED WITH RETURN FANS (RF-16A/16B). RUN STATUS OF EACH FAN SHALL BE PROVEN BY THE CURRENT OUTPUT FROM ITS ASSOCIATED VFD. FAILURE OF ANY FAN THAT IS COMMANDED "ON" SHALL BE ALARMED AND THE FAN DE-ENERGIZED.

4.2 HIGH PRESSURE SENSOR, PSH-1, LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 8" OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT PSH-1 EXCEEDS 8" THE SUPPLY AIR FAN SHALL BE DE-ENERGIZED. PSH SHALL BE HARDWIRED TO THE SUPPLY FANS AND AHU SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSH WILL REQUIRE MANUAL RESET AT THE DEVICE.

4.3 HIGH PRESSURE SENSORS, PSH-2A, PSH-2B, LOCATED AT EACH RETURN/RELIEF FAN DISCHARGE, SHALL PREVENT THE RETURN FANS FROM DEVELOPING OVER 4" OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT PSH-2 EXCEEDS 4" THE RETURN AIR FAN SHALL BE DE-ENERGIZED. A PSH SHALL BE HARDWIRED TO EACH RETURN FAN AND THE AHU SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSH WILL REQUIRE MANUAL RESET AT THE DEVICE.

4.4 LOW PRESSURE SENSOR PSL-1 LOCATED WITHIN INLET PLENUM TO SUPPLY FANS SHALL PREVENT THE SUPPLY FANS FROM DEVELOPING OVER -8" OF NEGATIVE STATIC PRESSURE (FIELD ADJUSTABLE) IF STATIC PRESSURE AT PSL-1 DOES EXCEED -8" THE SUPPLY FANS SHALL BE DE-ENERGIZED. PSL SHALL BE HARDWIRED TO SUPPLY FANS AND THE AHU SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSL WILL REQUIRE MANUAL RESET.

4.5 LOW PRESSURE SENSORS, PSL-2A, PSL-2B, LOCATED AT EACH RETURN/RELIEF FAN INLET SHALL PREVENT THE RETURN FAN FROM DEVELOPING OVER -4" OF NEGATIVE STATIC PRESSURE (FIELD ADJUSTABLE) IF STATIC PRESSURE AT PSL DOES EXCEED -4" THE RETURN AIR FAN SHALL BE DE-ENERGIZED. A PSL SHALL BE HARDWIRED TO EACH RETURN FAN AND THE AHU SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSL WILL REQUIRE MANUAL RESET.

4.6 SPECIAL FILTRATION UNIT (BIOLOGICAL/UV FILTER – GAPC) SHALL OPERATE/BE ENERGIZED AT ALL TIMES WHEN AHU SUPPLY FANS/RETURN FANS ARE OPERATING. WHEN AHU IS INDEXED TO SHUT-DOWN, UV LIGHTING WITHIN SPECIAL FILTRATION UNIT (BIOLOGICAL/UV FILTER – GAPC) SHALL BE DE-ENERGIZED AND PROVEN OFF VIA CURRENT TRANSMITTER. CHANGES IN CURRENT SHALL ALSO BE MONITORED FOR REMOTE INDICATION OF MAINTENANCE REQUIREMENT FOR UV LAMPS. ACCESS DOORS INTO AHU SECTION(S) WITH UV LIGHTING SHALL INCLUDE SAFETY SWITCH TO SHUT DOWN THE UV LIGHTS UPON ENTRANCE TO THE AHU AIR TUNNEL.

5. HUMIDITY CONTROL

5.1 RETURN AIR HUMIDITY (% RH) SHALL BE MEASURED, MONITORED AND ALARMED. UPON A CALL FOR HUMIDIFICATION AND FOLLOWING BAS VERIFICATION OF AIRFLOW WITHIN THE AHU VIA FAN CURRENT SWITCHES, HUMIDIFIER CONTROL VALVE, V-4, SHALL MODULATE TO MAINTAIN THE RETURN AIR MINIMUM RELATIVE HUMIDITY SET POINT OF 30% RH (ADJUSTABLE). PRIOR TO ACTIVATION OF CONTROL VALVE, V-4, THE ON-OFF/BLOCKING CONTROL VALVE, V-5, SHALL BE OPENED.

5.2 THE HIGH LIMIT HUMIDITY SENSOR, MOUNTED A MINIMUM OF 10 FEET AWAY FROM THE AHU HUMIDIFIER DISPERSION PANEL, SHALL DISABLE THE HUMIDIFIER AND GENERATE AN ALARM WITHIN THE BAS IF THE SUPPLY AIR RELATIVE HUMIDITY EXCEEDS 90% (ADJUSTABLE) TEN FEET FROM THE AHU DISPERSION PANEL. IF THE AHU SUPPLY AIR HUMIDITY MEASURED VIA SENSOR MT-1 EXCEEDS 80% (ADJUSTABLE), GENERATE AN ALARM WITHIN THE BAS. IF MT-1 EXCEEDS 85%, BAS SHALL DISABLE THE HUMIDIFIER. THE DRYBULB TRANSMITTER, TT-7, AND HUMIDITY TRANSMITTER, MT-5, WITHIN THE AHU RETURN AIR PLENUM SHALL BE USED TO CALCULATE RETURN AIR DEW POINT TEMPERATURE AND RELATIVE HUMIDITY.

5.3 THE BAS SHALL ALSO MAINTAIN SUPPLY AIR DISCHARGE DEW POINT SETPOINT CONTROL AS NOTED HEREIN AND MONITOR/ALARM FOR MAXIMUM SPACE RELATIVE HUMIDITY, MAINTAINING A MAXIMUM RETURN AIR RELATIVE HUMIDITY SET POINT OF 60% (ADJUSTABLE) DURING ECONOMIZER AND COOLING PERIODS. THE BAS SHALL MONITOR RETURN AIR RELATIVE HUMIDITY AND MODULATE COOLING COIL CONTROL VALVE TO MAINTAIN RETURN AIR RELATIVE HUMIDITY BELOW 60%. SEE ALSO DISCHARGE AIR DEW-POINT CONTROL SEQUENCE IN COOLING COIL CONTROL SECTION.

5.4 THE BAS SHALL ALSO MONITOR SPACE HUMIDITY (% RH) WITHIN EACH OPERATING ROOM IN ADDITION TO THE OVERALL RELATIVE HUMIDITY OF THE FULL RETURN AIRSTREAM. OPERATING ROOM HUMIDITY LEVELS SHALL BE TRENDED AND ALARMED AS A FEEDBACK CONTROL OF AHU SUPPLY AIR DISCHARGE HUMIDITY SETPOINT CONTROL/MAINTINATING OVERALL STATUS OF THE AHU HUMIDIFICATION SYSTEM PERFORMANCE.

6. FILTER MONITORING

6.1 BAS SHALL READ THE DIFFERENTIAL PRESSURE ACROSS EACH FILTER BANK AND GENERATE HIGH AND HIGH-HIGH ALARMS AT EACH FILTER BANK'S SET POINTS.

6.2 AHU DEHUMIDIFICATION AND HUMIDIFICATION CONTROLS SHALL BE ACCURATELY TUNED TO PREVENT MOISTURE WICKING WITHIN FILTRATION MEDIA (SPECIAL FILTER/FINAL-HEPA FILTERS). PROPER AHU CONTROL AND INSTALLATION/MAINTAINENCE OF FILTER MEDIA AS SPECIFIED AND SCHEDULED FOR SPECIAL/FINAL FILTERS SHALL BE PROVIDED/VERIFIED TO PREVENT HIGH STATIC PRESSURES AND FILTRATION FAILURES.

7. PREHEAT COIL CONTROL

7.1 THE BAS SHALL MAINTAIN A CONSTANT SUPPLY AIR TEMPERATURE DISCHARGE.

7.2 THE BAS SHALL MODULATE THE STEAM PREHEAT COIL AND THE CHILLED WATER COOLING COIL IN SEQUENCE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

7.3 WHEN THE TEMPERATURE ENTERING THE PREHEAT COIL (TT-3) IS AT OR ABOVE THE FREEZE PROTECTION SET POINT, THE FACE & BYPASS DAMPERS ARE FULL OPEN TO THE COIL (BYPASS CLOSED) AND THE STEAM CONTROL VALVE MODULATES TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

7.4 WHEN THE TEMPERATURE ENTERING THE PREHEAT COIL (TT-3) IS BELOW THE FREEZE PROTECTION SET POINT, THE STEAM CONTROL VALVE SHALL FULLY OPEN AND THE FACE & BYPASS DAMPERS SHALL MODULATE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

7.5 WHEN THE AIR HANDLING UNIT IS INDEXED TO START AND THE OUTDOOR AIR IS BELOW THE FREEZE PROTECTION SET POINT, THE PREHEAT COIL CONTROL VALVE SHALL OPEN AND THE FACE & BYPASS DAMPERS SHALL BE OPEN TO THE FULL FACE POSITION.

8. COOLING COIL CONTROL

8.1 THE BAS SHALL CALCULATE, DISPLAY, AND CONTINUOUSLY UPDATE THE SUPPLY AIR DEW POINT TEMPERATURE.

8.2 THE BAS SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

8.3 THE SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON THE SYSTEM REHEAT COIL VALVE POSITIONS. THE BAS SHALL DETERMINE THE MOST CLOSED REHEAT COIL CONTROL VALVE IN THE SYSTEM. IF THE VALVE IS LESS THAN 5% OPEN (ADJ), THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE SET POINT DOWNWARD IN 0.1° F INCREMENTS TO THE MINIMUM SET POINT. IF THE MOST CLOSED REHEAT COIL VALVE IS OPEN GREATER THAN 15% (ADJ), THE BAS SHALL RESET THE SUPPLY AIR SET POINT UPWARD IN 0.1° F INCREMENTS PER MINUTE TO THE MAXIMUM SET POINT.

8.4 IF THE DISCHARGE AIR DEW POINT TEMPERATURE EXCEEDS ITS SET POINT, THE BAS SHALL PROVE HUMIDIFICATION ADDITION IS NOT ACTIVE/HUMIDIFIER BLOCKING AND CONTROL VALVES ARE CLOSED. BAS SHALL THEN OVER-RIDE THE SUPPLY AIR DISCHARGE TEMPERATURE CONTROL AND MODULATE THE COOLING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE DEW POINT TEMPERATURE SET POINT. SHOULD THE CHILLED WATER PLANT/CHILLERS/CHILLED WATER DISTRIBUTION PUMPS BE ON SEASONAL SHUT-DOWN AS PROVEN WITHIN THE BAS AND NO CHILLED WATER FLOW AVAILABLE TO ALLOW DISCHARGE ENTHALPY CONTROL, BAS SHALL ALARM THAT AHU DISCHARGE AIR ENTHALPY HAS EXCEEDED SETPOINT. VAMC TO REVIEW IF EMERGENCY POWER CHILLED WATER SEQUENCE TO BE ENGAGED TO ALLOW DEHUMIDIFICATION OF SUPPLY DISCHARGE AIR DURING PERIODS WHEN SITE CHILLED WATER PLANT HAS BEEN SHUTDOWN.

8.5 MAIN RETURN AIR DUCT AND INDIVIDUAL SURGICAL/OPERATING ROOM MOISTURE SENSORS/HUMIDISTATS SHALL BE MONITORED AND ALARMED WITHIN BAS AS ADDITIONAL FEEDBACK TO CONFIRM SPACE RELATIVE HUMIDITY (% RH) SETPOINT IS MAINTAINED DURING COOLING COIL OPERATION/DEHUMIDIFICATION MODE.

8.6 THE BAS SHALL NOT PERMIT SIMULTANEOUS AHU HEATING/COOLING OPERATION OR SIMULTANEOUS AHU HUMIDIFICATION/DEHUMIDIFICATION OPERATION.

9. LOSS OF HEATING/FREEZE PROTECTION

9.1 IF THE AIR TEMPERATURE, AS SENSED BY TT-4, FALLS BELOW 45°F [7.2°C], AN ALARM SIGNAL SHALL BE GENERATED LOCALLY AT THE AHU CONTROL PANEL AND WITHIN THE BAS. IF THIS TEMPERATURE FALLS BELOW 40°F [4.4°C], AS SENSED BY THE TSL, THE SUPPLY AND RETURN FANS SHALL DISABLED, THE OUTDOOR AIR AND RELIEF AIR DAMPERS SHALL CLOSE AND A CRITICAL ALARM SHALL BE GENERATED AT THE AHU CONTROL PANEL AND WITHIN THE BAS. TSL SHALL BE HARDWIRED TO THE SUPPLY FANS AND RETURN FANS AND BOTH SETS OF FANS SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. TSL WILL REQUIRE MANUAL RESET AT THE DEVICE.

10. LOSS OF COOLING/DEHUMIDIFICATION

10.1 DURING COOLING MODE/WHEN THERE IS A CALL FOR COOLING/DEHUMIDIFICATION, IF THE AIR TEMPERATURE AS SENSED BY TT-1 RAISES ABOVE 58°F [14.4°C], AN ALARM SIGNAL SHALL BE GENERATED AT THE LOCAL AHU CONTROLLER AND WITHIN THE BAS SYSTEM. IF THIS TEMPERATURE RAISES ABOVE 65°F [18.3°C], AS SENSED BY TT-1 THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE LOCAL AHU CONTROL PANEL AND WITHIN THE BAS.

11. EMERGENCY CONSTANT SPEED OPERATION

11.1 UPON FAILURE OF THE VARIABLE FREQUENCY DRIVES/VARIABLE SPEED MOTOR CONTROLLERS, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED (AFTER BAS VERIFICATION VIA DAMPER END SWITCHES THAT ALL START-UP REQUIRED OPEN DAMPERS ARE OPEN) MANUALLY AT THE AIR HANDLING UNIT CONTROL PANEL OR REMOTELY IN THE BAS VIA THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

12. SMOKE SHUTDOWN/RESTART (SMOKE DETECTED AT AHU SUPPLY DISCHARGE)

12.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD-1, THE AHU SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED WITHIN THE BAS AND TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS AT THE AHU SUPPLY AND RETURN CONNECTIONS SHALL CLOSE. THE OUTDOOR AIR AND RELIEF AIR DAMPERS SHALL ALSO CLOSE.

12.2 EXISTING EXHAUST FAN EF-8, SERVING SPECIFIC AREAS OF AC-16 COVERAGE, SHALL CONTINUE TO RUN. EXHAUST AIRFLOW CONTROL VALVES FOR SURGICAL SUITE ROOMS SERVED BY EF-8 SHALL BE DRIVEN TO THEIR CLOSED POSITIONS TO MINIMIZE PRESSURE DIFFERENTIAL ACROSS SPACE BOUNDARIES UNTIL AC-16 IS MANUALLY RESTARTED/AHU SMOKE IS PROVEN CLEARED BY VAMC/AUTHORIZED PERSONNEL. AHU SHALL RESTART AND AHU SMOKE/ISOLATION DAMPERS SHALL OPEN WHEN THE FIRE ALARM CIRCUIT IS RESET BY VAMC.

13. SMOKE PURGE MODE (SMOKE DETECTED AT RETURN FAN INLET PLENUM)

13.1 WHEN SMOKE IS DETECTED BY A FIRE ALARM SYSTEM DEVICE WITHIN THE NEW STERILE SURGICAL SUITE AND/OR BY DUCT SMOKE DETECTOR, SD-2, WITHIN THE RETURN AIRSTREAM (MAIN INLET PLENUM WITHIN PEM PRIOR TO RETURN FANS) DRAWN BACK FROM THE SURGICAL SUITE/OPERATING ROOMS, THE AHU SUPPLY AND RETURN FANS SHALL CONTINUE TO OPERATE AND AN ALARM SIGNAL SHALL BE TRANSMITTED WITHIN THE BAS AND TO THE FIRE ALARM SYSTEM. SMOKE DAMPER (SD-2) AND MODULATING DAMPER (D-3) AT THE AHU RETURN/MIXING CONNECTION SHALL BOTH CLOSE. THE OUTDOOR AIR (D-1/D-2) AND RELIEF AIR (D-4) DAMPERS SHALL FULLY OPEN. AHU SHALL BE DRIVEN TO 100% OUTDOOR AIR OPERATION FOR SMOKE PURGE MODE. ALL AIRFLOW CONTROL VALVES SHALL BE DRIVEN TO THEIR SMOKE PURGE MODE SET POINTS (REFER TO AIRFLOW CONTROL VALVE SCHEDULES FOR MORE INFORMATION) AND SUPPLY FANS/RETURN FAN VFD'S SHALL MODULATE FAN SPEEDS TO SATISFY STATIC PRESSURE AND AIRFLOW RATES TO MAINTAIN SURGICAL SUITE SPACES NEUTRAL TO ONE ANOTHER DURING SMOKE PURGE MODE. ALTHOUGH THIS MODE REPRESENTS AN EMERGENCY OPERATION MODE, AHU DISCHARGE TEMPERATURE/HUMIDIFICATION SETPOINT CONTROL IS INTENDED TO REMAIN IN PLACE/ACHIEVE DESIGN WITH THE EXCEPTION OF SUMMER PEAK COOLING/DEHUMIDIFICATION AS COOLING COILS ARE NOT SIZED FOR 100% OUTDOOR AIR LOADS AT SUMMER MAXIMUM OA DRY BULB/WET BULB CLIMATIC CONDITIONS. SET POINTS FOR TEMPERATURE/ENTHALPY CONTROL REMAIN IN EFFECT ALTHOUGH COMFORT COOLING/DEHUMIDIFICATION IS NOT PRIORITY DURING THIS EMERGENCY CONDITION.

13.2 EXISTING AIR HANDLING UNIT AC-8 AND EXHAUST FAN EF-8, SERVING CERTAIN ROOMS WITHIN THE STERILE SURGICAL SUITE, SHALL CONTINUE TO RUN/SERVE THE NEW PACU/RECOVERY SUITE AND SPACES INDICATED BY DRAWING M7.00/EQUIPMENT SCHEDULES. SUPPLY AND EXHAUST AIR TERMINAL UNITS SERVING SURGICAL SUITE ROOMS SERVED BY AC-8/EF-8 SHALL BE DRIVEN TO THEIR SMOKE PURGE MODE DESIGN SET-POINTS TO MINIMIZE PRESSURE DIFFERENTIAL ACROSS SPACE BOUNDARIES UNTIL AC-16 SMOKE PURGE MODE IS SHUT DOWN/AHU SMOKE PURGE MODE IS PROVEN COMPLETE/SMOKE IS PROVEN CLEARED FROM THE SURGICAL SUITE BY VAMC/AUTHORIZED PERSONNEL. AC-16 SHALL BE ALLOWED TO ENGAGE RESTART SEQUENCE AND AHU RETURN SMOKE/MIXING DAMPERS SHALL BE OPENED ONLY WHEN THE FIRE ALARM CIRCUIT IS RESET BY VAMC.

14. LOSS OF NORMAL POWER/BAS-INDEXED SHUTDOWN AND AUTOMATIC RESTART

14.1 UPON A LOSS OF NORMAL POWER, THE AHU AND ALL COMPONENTS WITHIN THE PENTHOUSE EQUIPMENT MODULE SHALL CONTINUE TO OPERATE AS PER THE SEQUENCES HEREIN. SINCE THE EMERGENCY CHILLED WATER SYSTEM IS SHARED BY MULTIPLE AHU'S (AC-16/NEW OR'S, AC-8/PACU AND AC-10/PRE-OP), THE COOLING/DEHUMIDICATION SUPPLY AIR TEMPERATURE AND ENTHALPY CONTROL SEQUENCES FOR THE NEW SURGERY/OR AHU (AC-16) SHALL BE PRIORITIZED WITHIN THE BAS SYSTEM ABOVE THE DISCHARGE AIR COOLING/ENTHALPY CONTROL OF THE EXISTING AHU'S AC-8 AND AC-10. SECOND PRIORITY SHALL BE GIVEN TO AC-8 (PACU) AND THIRD PRIORITY TO AC-10 (PRE-OP). SIMILAR PRIORITY SHALL BE PROVIDED SHOULD EMERGENCY POWER SYSTEM REQUIRE COMPLETE SHUT DOWNS OF THESE AHU'S DUE TO A POTENTIAL SHORTAGE OF EMERGENCY GENERATOR/EMERGENCY POWER CAPACITY.

14.2 WHEN A SHUTDOWN COMMAND IS GENERATED BY THE BAS, OR AT THE LOCAL AHU CONTROL PANEL, THE AHU WILL DE-ENERGIZE. ALL OUTDOOR AIR, SMOKE AND ISOLATION DAMPERS ON THE AHU AND AT THE RETURN FANS/RELIEF DISCHARGE LOUVER SHALL CLOSE. ALL CONTROL VALVES AT THE AHU SHALL CLOSE. AN ALARM SHALL BE GENERATED WITHIN THE BAS THAT THE AHU IS SHUTDOWN. THE AHU SHALL RESTART AUTOMATICALLY BY FOLLOWING THE NORMAL START-UP SEQUENCE WHEN A REMOTE OR LOCAL START COMMAND IS GENERATED BY THE BAS.

14.3 STARTUP OF PROJECT AREA AHU SYSTEMS SHALL BE PRIORITIZED WITHIN THE BAS AS FOLLOWS: AC-16/RF-16, AC-8/EF-8, AC-10/EF-10, EF-15, EF-20.

15. NORMAL START-UP/WARM UP MODE AND SHUTDOWN

15.1 WHENEVER THE AHU IS INDEXED TO START OR INDEXED TO WARM-UP MODE, THE OUTSIDE AIR AND EXHAUST AIR DAMPERS (D-1, D-2, D-4) SHALL BE CLOSED/PROVEN IN THEIR CLOSED POSITION. THE BAS SHALL OPEN/PROVE OPEN THE RETURN FAN ISOLATION DAMPERS (D-5, D-6), THE AHU SUPPLY/RETURN SMOKE DAMPERS (SD-1, SD-2) AND THE RETURN/MIXING DAMPER (SD-3) .

15.2 FOR WARM UP MODE, THE RECIRCULATION OF BUILDING AIR AT THE AIRFLOW CONTROL VALVE OCCUPIED SETPOINTS SHALL BE ALLOWED FOR ONE HOUR BEFORE NORMAL OCCUPIED MODE (ADJUSTABLE). COORDINATE WITH VAMC FOR WARM-UP MODE DURATION.

15.3 FOR NORMAL START-UP, WHEN THE SMOKE DAMPERS ARE PROVEN OPEN VIA THEIR RESPECTIVE END SWITCHES AND ALL SAFETIES ARE SATISFIED, THE SUPPLY AND RETURN FANS SHALL BE ENERGIZED.

15.4 WHEN THE SUPPLY AND RETURN FANS ARE PROVEN ON, THE TEMPERATURE, HUMIDITY, AND AIR FLOW CONTROLS SHALL BE ENABLED. ONCE RECIRCULATION MODE HAS RUN TO ESTABLISH AIRFLOW START-UP STABILITY, THE MINIMUM/MAXIMUM OUTDOOR AIR AND RELIEF/EXHAUST AIR DAMPERS SHALL BE ALLOWED TO MODULATE WHILE ADJUSTING THE RECIRCULATING/MIXING DAMPER AS REQUIRED TO ENGAGE THE APPROPRIATE AHU OPERATION MODE (ECONOMIZER, 100% ECONOMIZER, MIN. OA/FIXED RETURN, ETC.) WITH THE APPROPRIATE HEATING, COOLING, HUMIDIFICATION, DEHUMIDIFCATION/DEW POINT CONTROL AS DESCRIBED HEREIN.

15.5 STARTUP OF PROJECT AREA AHU SYSTEMS SHALL BE PRIORITIZED WITHIN THE BAS AS FOLLOWS: AC-16/RF-16, AC-8/EF-8, AC-10/EF-10, EF-15, EF-20, AC-9/RF-9, EF-19.

16. UNOCCUPIED MODE OVERRIDE – TEMPORARY OCCUPIED MODE

16.1 COORDINATE UNOCCUPIED MODE SCHEDULE AND DURATIONS BASED UPON FINAL VAMC-APPROVED TIME OF DAY, DAY OF THE YEAR SCHEDULE AND BUILDING/SURGICAL SUITE OCCUPANCY.

16.2 HVAC SYSTEM SHALL BE CAPABLE OF BEING INDEXED TO OCCUPIED MODE TEMPORARILY FOR AN ADJUSTABLE PERIOD OF TIME (1 HOUR INITIAL TIME FRAME – VAMC TO CONFIRM) AS INITIATED BY A LOCAL, SECURED, UNOCCUPIED OVERRIDE PUSH BUTTON LOCATED AT THE MAIN SURGICAL SUITE NURSE STATION/CONTROL 3B-159. ACCESS TO ENCLOSURE HOUSING THE PUSH BUTTON SHALL BE VIA KEY AND SHALL BE BY AUTHORIZED AND APPROVED VAMC PERSONNEL ONLY (EXAMPLES OF PERSONNEL INCLUDE VAMC NURSING/SURGICAL STAFF, VAMC FACILITIES ENGINEERS, VAMC SECURITY/CLEANING STAFF, ETC.). REFER TO DRAWING M7.00 FOR LOCATION OF UNOCCUPIED OVERRIDE PUSH BUTTON LOCATIONS FOR EACH NEW/EXISTING AHU SYSTEM SERVING THE RENOVATED AREAS (AC-16, AC-8, AC-10, AC-9).

17. SETPOINTS – ADJUSTABLE

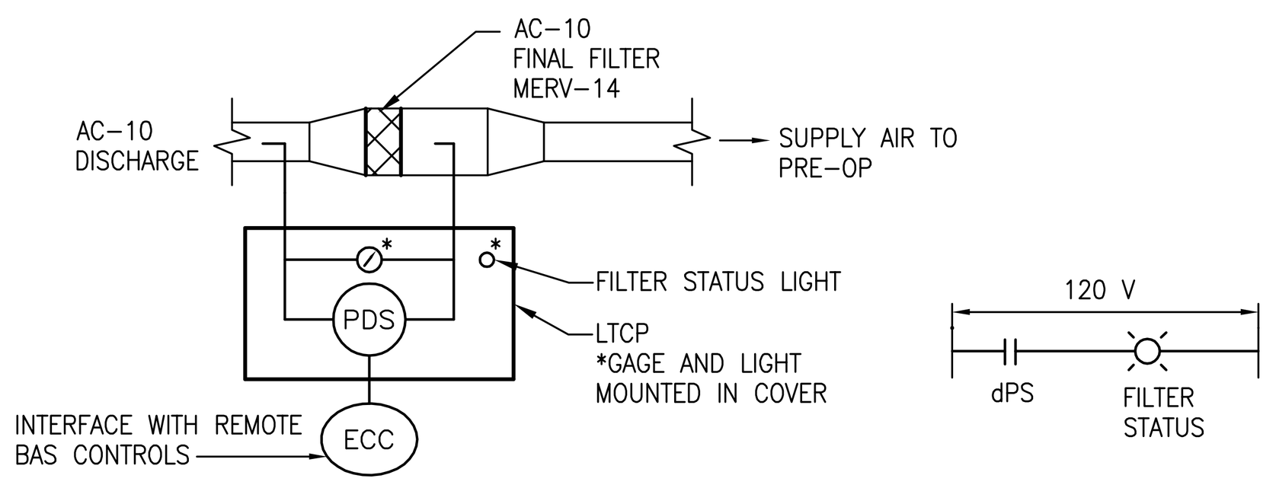
NOTE: SITE ELEVATION FOR HUNTINGTON, WV: 837 FEET ABOVE SEA LEVEL

• FREEZESTAT:	40°F
• FREEZE PROTECTION:	45°F
• SUPPLY AIR DISCHARGE TEMPERATURE:	55°F
• SA DISCHARGE TEMPERATURE RESET MINIMUM:	50°F
• SA DISCHARGE TEMPERATURE RESET MAXIMUM:	60°F
• SUPPLY AIR MAX DEW POINT TEMPERATURE:	50.6°F
• MIXED AIR TEMPERATURE (ECONOMIZER, TT-3):	51.5°F
• SUPPLY AIR RELATIVE HUMIDITY (HUMIDITY ADDITION):	65%
• HIGH LIMIT RELATIVE HUMIDITY:	85%
• RETURN AIR RELATIVE HUMIDITY (HEATING SEASON):	30%
• PRE-FILTER-1: HIGH, HIGH-HIGH DIFF. PRESSURE:	0.5" WC, 0.75" WC
• PRE-FILTER-2: HIGH, HIGH-HIGH DIFF. PRESSURE:	0.75" WC, 1.0" WC
• FINAL-FILTER(HEPA): HIGH, HIGH-HIGH DIFF. PRESSURE:	2.5" WC, 2.75" WC

1 AIR HANDLING UNIT FOR SURGICAL SUITE (OCC-UNOCC/VARIABLE FLOW) - 1S-AC-16

NTS

SEQUENCE OF OPERATION FOR AIR HANDLING UNIT FOR OPERATING ROOMS/STERILE SURGICAL SUITE (VAV)



1. PRE-OP AHU – AC-10 FINAL FILTER DP MONITORING

_1.1 MEASURE DIFFERENTIAL PRESSURE ACROSS EACH FILTER BANK/FILTER STAGE. WHEN FILTER PRESSURE DROP RISES ABOVE THE SCHEDULED LIMIT, FILTER STATUS LIGHT (RED) FOR THAT SEGMENT SHALL BE ENERGIZED AND BAS SHALL ALARM.

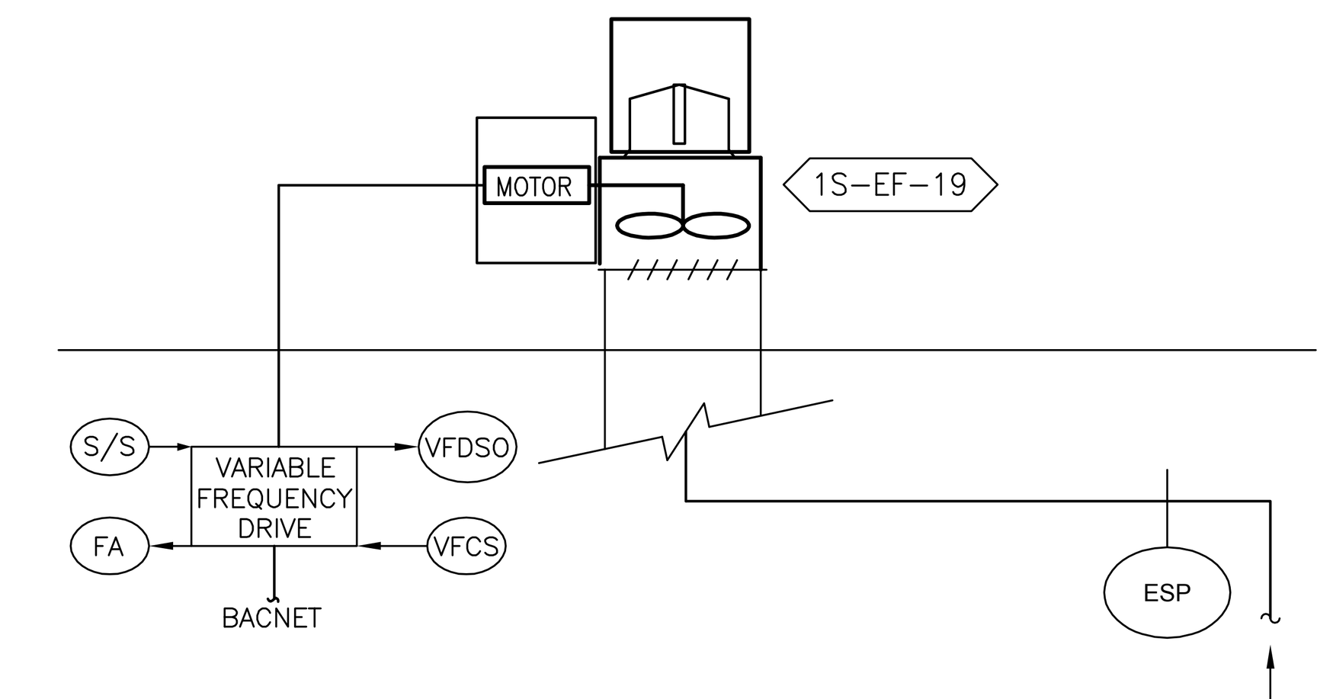
1.2 MAX. LIMITS: (0.75" W.G.) FINAL FILTER HIGH LIMIT, (1.0" W.G.) HIGH-HIGH LIMIT

1.3 MAXIMUM LOSS ACROSS TOTAL FILTER BANK NOT TO EXCEED 1.25 INCHES. BAS SHALL ALARM IF PRESSURE DROP ACROSS ENTIRE FILTER BANK REACHES 1.25 INCHES AND/OR STATIC PRESSURE REQUIREMENT UPSTREAM OF FILTER BANK IS NOT MAINTAINED PER CURRENT OPERATING FAN SEQUENCE OF OPERATION FOR EXISTING AC-10.

2 FILTER HOUSING - 1S-FF-10- DP MONITORING

NTS

ROOFTOP EXHAUST FAN



1. SURGICAL LOCKERS/LOUNGE EXHAUST FAN

_1.1 THE BAS SHALL HAVE START-STOP CAPABILITY OVER THE FAN.

1.2 THE FAN SHALL BE CONNECTED TO EMERGENCY POWER AND SHALL RUN CONTINUOUSLY.

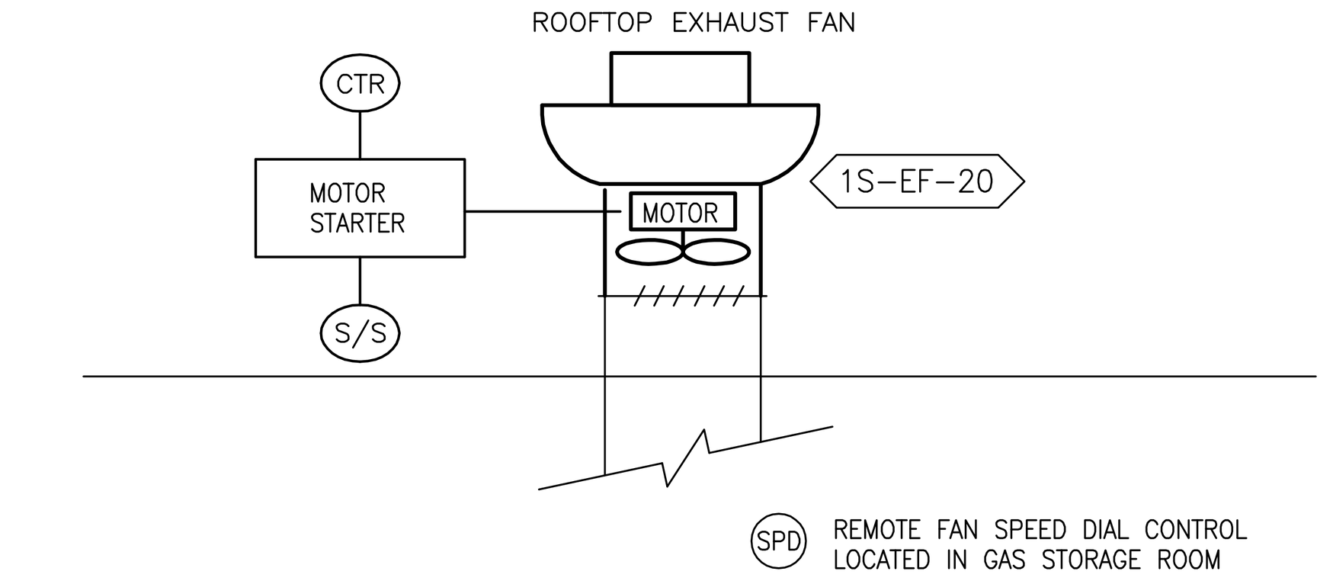
1.3 THE BAS SHALL MONITOR FAN STATUS AND SHALL ALARM IF FAN FAILS.

1.4 THE BAS SHALL MODULATE THE VARIABLE FREQUENCY DRIVE TO MAINTAIN THE INLET STATIC PRESSURE SETPOINT AT ESP, INITIALLY 1" (ADJ). COORDINATE PLACEMENT OF STATIC PRESSURE SENSOR IN DUCTWORK SYSTEM AND FINAL STATIC PRESSURE SETPOINT WITH WITH TAB CONTRACTOR BASED UPON BALANCING EFFORTS FOR AREAS SERVED.

3 EXHAUST FAN - 1S-EF-19 - CONTROL

NTS

ROOFTOP EXHAUST FAN



SPD REMOTE FAN SPEED DIAL CONTROL LOCATED IN GAS STORAGE ROOM

1. GAS STORAGE ROOM EXHAUST FAN

_1.1 THE BAS SHALL HAVE START-STOP CAPABILITY OVER THE FAN.

1.2 THE FAN SHALL BE CONNECTED TO EMERGENCY POWER AND SHALL RUN CONTINUOUSLY.

1.3 THE BAS SHALL MONITOR FAN STATUS AND SHALL ALARM IF FAN FAILS.

1.4 THE FAN SHALL INCLUDE EC MOTOR WITH REMOTE DIAL FAN SPEED ADJUSTMENT THAT SHALL BE MOUNTED ON WALL WITHIN GAS STORAGE ROOM.

4 EXHAUST FAN - 1S-EF-20 - CONTROL

NTS

100% CONSTRUCTION DOCUMENTS

FULLY SPRINKLERED

NO.	DESCRIPTION	DATE

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Drawing Title	MECHANICAL CONTROLS
Approved: Medical Center Director	
Project Title	RENOVATE SURGICAL SERVICE & UPGRADE OPERATING ROOMS
Location	HUNTINGTON, WV
Date	10.31.2014
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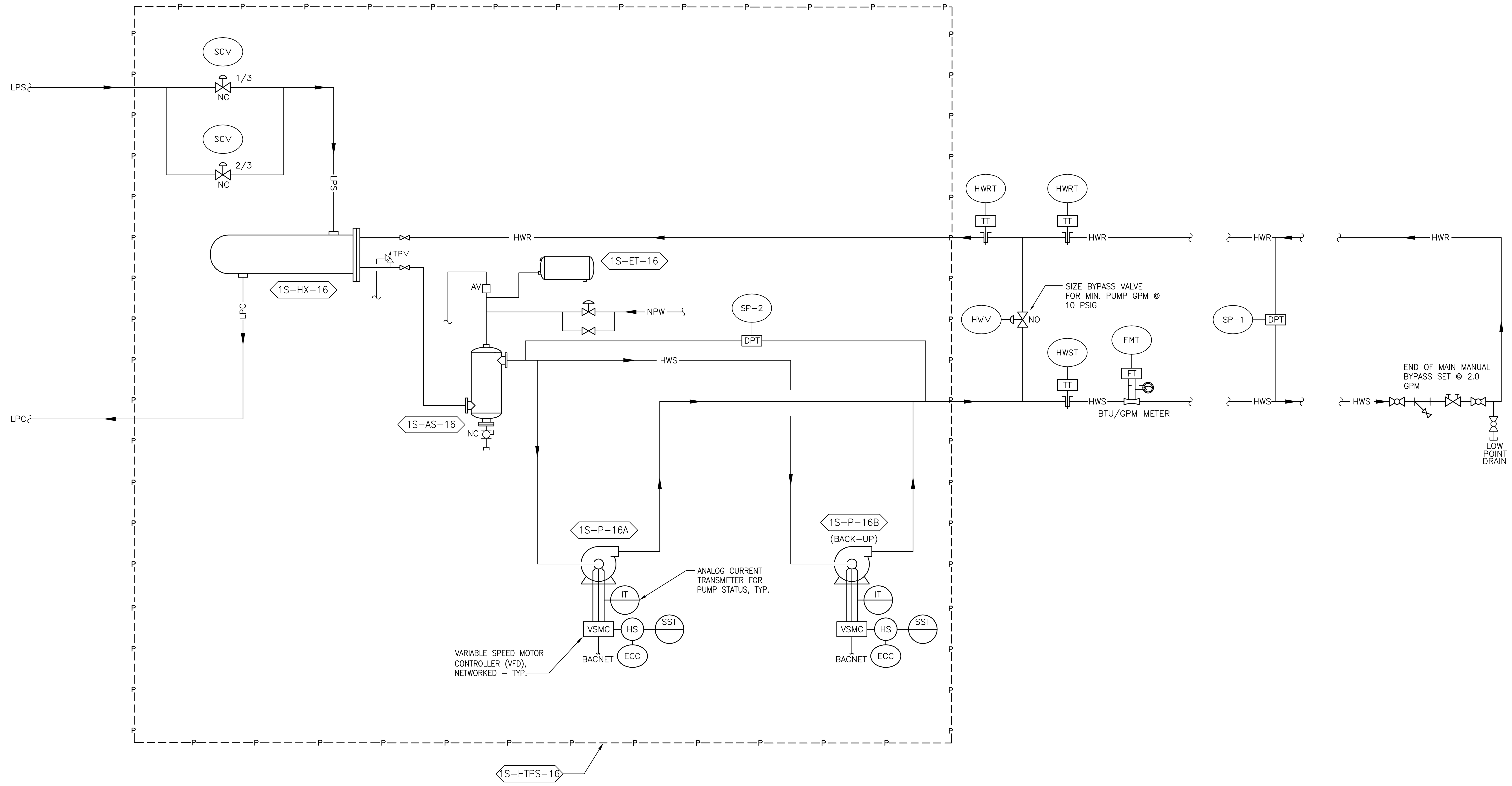
Drawn	JLR
Project Number	581-13-101
Building Number	1S
Drawing Number	M8.01
Dwg.	088 of 178

Office of Construction and Facilities Management

Department of Veterans Affairs



1 HEATING HOT WATER GENERATION AND DISTRIBUTION SYSTEM (REHEAT)

NTS

SEQUENCE OF OPERATIONS FOR HEATING HOT WATER/REHEAT SYSTEM

1. GENERAL

1.1 PUMPS 1S-P-16A AND 1S-P-16B SHALL BE STARTED AND STOPPED AUTOMATICALLY BY THE BUILDING AUTOMATION SYSTEM (BAS) DURING OCCUPIED AND UNOCCUPIED PERIODS.

1.2 PROVIDE ON/OFF RUN STATUS INDICATION FOR EACH PUMP THROUGH THE VARIABLE FREQUENCY DRIVE.

1.3 PUMPS 1S-P-16A AND 1S-P-16B SHALL BE CAPABLE OF MANUAL OPERATION.

1.4 ALL SET POINTS SHALL BE ADJUSTABLE.

1.5 HEATING HOT WATER SYSTEM (PUMPS, VFD'S, CONTROLS) IS TO BE CONNECTED TO EMERGENCY POWER AND IS INTENDED TO OPERATE CONTINUOUSLY. PUMPS ARE FULLY REDUNDANT.

1.6 BAS SHALL MONITOR HEATING HOT WATER SYSTEM FLOW AND ENERGY BTUH FOR ALL OPERATING MODES.

2. PUMPS

2.1 HEATING WATER PUMPS (1S-P-16A AND 1S-P-16B) SHALL BE INDIVIDUALLY CONTROLLED THROUGH THE BAS TO PROVIDE AUTOMATIC LEAD LAG CONTROL. UPON SENSING PUMP FAILURE OF THE LEAD PUMP, THE BAS SHALL START THE LAG PUMP. THE BAS SHALL START THE LAG PUMP AUTOMATICALLY. THE LEAD PUMP SHALL REPORT AS FAILED WITHIN THE BAS AND SHALL BE SHUT DOWN. ONE PUMP SHALL RUN CONTINUOUSLY, 24 HOURS PER DAY. LEAD AND LAG PUMPS SHALL ALTERNATE BASED UPON RUN HOURS. EVERY 500 HOURS OF OPERATION, ALTERNATE THE LEAD AND LAG PUMPS.

2.2 THE PUMPS VARIABLE FREQUENCY DRIVE (VFD) SHALL MAINTAIN THE REQUIRED SYSTEM DIFFERENTIAL PRESSURE, AS SENSED BY SP-1. THE WATER FLOW SHALL BE SUFFICIENT TO ACCOMMODATE THE DEMAND FOR HOT WATER, AS DETERMINED BY THE TESTING, ADJUSTING AND BALANCING CONTRACTOR. COORDINATE FINAL LOCATION OF SP-1 BASED UPON TAB CONTRACTOR BALANCING EFFORTS AND SETTING OF MINIMUM FLOW BALANCING VALVE AT THE END OF THE PEM BRANCH AS PER CONTROL DIAGRAM AND PLAN/PEM DETAIL DRAWING.

2.3 UPON SENSING DEACTIVATION OF BOTH HOT WATER PUMPS, THE SKIDS STEAM CONTROL VALVES SHALL CLOSE.

2.4 UPON FAILURE OF THE LEAD PUMP, THE LAG PUMP OF THE SAME SKID SHALL START AUTOMATICALLY AND THE BAS SHALL BE IN ALARM CONDITION.

3. STEAM CONTROL VALVES

3.1 VALVES SHALL BE SIZED FOR 35% FLOW AND 65% FLOW.

3.2 THE BAS SHALL MONITOR THE TEMPERATURE TRANSMITTER LOCATED IN THE MAIN SUPPLY HEADER. THE STEAM CONTROL VALVES SHALL BE MODULATED AS REQUIRED TO MAINTAIN SKID DISCHARGE TEMPERATURE BASED ON THE SIGNAL FROM THE TEMPERATURE TRANSMITTER IN THE MAIN.

3.3 THE 1/3 STEAM CONTROL VALVE SHALL MODULATE AS REQUIRED TO SATISFY THE 180°F (ADJ) HEATING WATER SUPPLY TEMPERATURE AS INDICATED BY THE TEMPERATURE TRANSMITTER LOCATED IN THE MAIN SUPPLY HEADER.

3.4 UPON A DROP IN WATER TEMPERATURE BELOW 180°F WHEN THE 1/3 CONTROL VALVE IS INDICATED TO BE 100% OPEN, THE 2/3 STEAM CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN THE HOT WATER DISCHARGE TEMPERATURE.

3.5 UPON A RISE IN DISCHARGE WATER TEMPERATURE ABOVE 180°F (ADJ) THE 2/3 CONTROL VALVE SHALL MODULATE CLOSED AND THE 1/3 CONTROL VALVE SHALL MODULATE TO MAINTAIN THE TEMPERATURE SET POINT.

4. HOT WATER DIFFERENTIAL PRESSURE CONTROL:

4.1 THE HOT WATER BYPASS VALVE WILL FAIL IN ITS LAST POSITION UPON A LOSS OF POWER TO THE VALVE ACTUATOR.

4.2 WHEN PROOF OF RUN IS NOT ESTABLISHED FOR EITHER HOT WATER PUMP, THE HOT WATER BYPASS VALVE WILL BE SIGNALED OPEN.

4.3 WHEN THE SYSTEM DIFFERENTIAL PRESSURE IS MET AND THE LEAD PUMP'S VFD SPEED FALLS TO 30% OF SETPOINT, (SPEED SETPOINT AS DETERMINTED/CONFIRMED BY THE TAB CONTRACTOR), THE LEAD PUMP'S VFD SHALL MAINTAIN THE CURRENT SPEED AND THE HOT WATER BYPASS CONTROL VALVE SHALL MODULATE TO MAINTAIN THE HOT WATER DIFFERENTIAL PRESSURE AT THE HOT WATER DIFFERENTIAL PRESSURE SET POINT (INITIALLY "10" PSI, (ADJ.) – FINAL SET POINT COORDINATED WITH TAB CONTRACTOR.

GENERAL SHEET NOTES:

1. SEE DWG. M0.01, M0.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

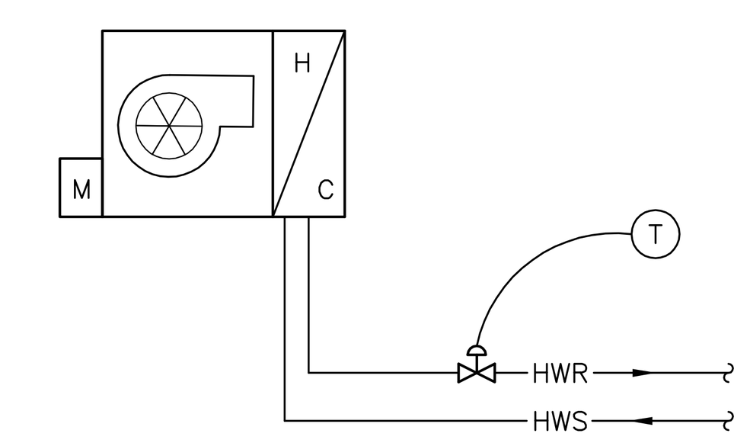
2. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE.

3. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED AND SMOKE PURGE OPERATION/MODES FOR THE NEW/SEPARATE HEATING HOT WATER SYSTEM TO SERVE AC-16 AS WELL AS EXISTING BUILDING 1 SOUTH REHEAT SYSTEM. REVIEW AND CONFIRM EXISTING CENTRAL PLANT HVAC EQUIPMENT, INCLUDING THE EXISTING BUILDING 1 SOUTH HEATING HOT WATER GENERATION AND DISTRIBUTION EQUIPMENT AND THE ASSOCIATED CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED BY AC-8, AC-9 AND AC-10 SEQUENCES OF OPERATION AND THE ASSOCIATED AIR TERMINAL UNIT SCHEDULED REHEAT WATER FLOW RATE VALUES AND THE NEW TUS/TUE SEQUENCES OF OPERATION. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING TOTAL REHEAT WATER FLOW AND SYSTEM DIFFERENTIAL PRESSURE MEASUREMENT FOR FLOW RATES/QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED.

4. COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED AND WARM-UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF UNOCC OVERRIDE PUSHBUTTON AND DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN THE WING IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY.

5. REFER TO ELECTRICAL PLANS AND COORDINATE EMERGENCY POWER SOURCE FOR NEW HEATING HOT WATER SYSTEM AND THE BAS CONTROLS/CONTROL PANEL(S) PANELS LOCATED WITHIN THE NEW PEM AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR HVAC SYSTEMS TO CONTINUE OPERATION DURING LOSS OF NORMAL POWER EVENT/EMERGENCY POWER OPERATION AS WELL AS AFTER TRANSITION BACK TO NORMAL POWER. NEW AIR HANDLING UNIT, AC-16 WILL BE POWERED FROM EMERGENCY POWER SOURCE. THEREFORE, HEATING HOT WATER SYSTEM, PUMPS, CONTROL VALVES AND ASSOCIATED BAS CONTROLS/CONTROL PANELS SHALL ALSO BE POWERED BY EMERGENCY POWER.

6. REFER TO PEM AND PIPING DETAIL SHEETS FOR ADDITIONAL PIPING AND VALVING REQUIREMENTS ASSOCIATED WITH HEATING HOT WATER SYSTEM.



1. PHASE 1A – TEMPORARY GAS STORAGE ROOM SPACE HEATING

1.1 BAS TO INCLUDE LOCAL TEMPERATURE SENSOR WITHIN THE TEMPORARY GAS STORAGE ROOM (PHASE 1A THROUGH COMPLETION OF PHASE 4A)., REPRESENTING THE HEATING/VENTILATION TEMPERATURE CONTROL ZONE. BAS TO MONITOR RELOCATED/EXISTING EXHAUST FAN 1S-EF-11 FOR GENERAL FAULT/FAILURE STATUS.

1.2 A SINGLE HOT WATER UNIT HEATER WILL BE PLACED WITHIN THE SPACE ADJACENT TO THE NEW OUTDOOR AIR MAKE-UP/INTAKE WALL LOUVER/INTAKE FILTER ASSEMBLY. AN EXISTING SUSPENDED INLINE EXHAUST FAN (EXIST. EF-11) WILL BE RELOCATED/REUSED AND SHALL BE INSTALLED ABOVE THE NEW MAKE-UP AIR INLET TO PROVIDE VENTILATION OF THE GAS STORAGE ROOM. THE EXHAUST FAN SHALL OPERATE CONTINUOUSLY WHILE THE UNIT HEATER SHALL OPERATE ONLY UPON A BAS CALL FOR HEATING.

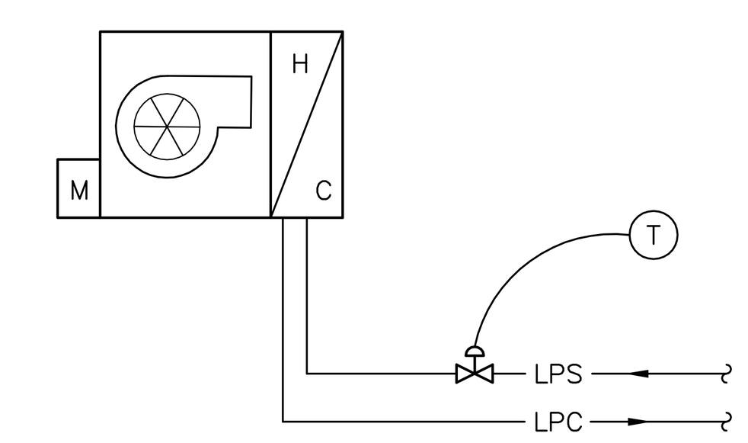
1.3 UPON A BAS SYSTEM CALL FOR HEATING WITHIN THE TEMPORARY GAS STORAGE ROOM, THE BAS SHALL SHALL MODULATE UNIT HEATER HEATING HOT WATER CONTROL VALVE AND ENGAGE THE UNIT HEATER FAN MOTOR TO MAINTAIN TEMPERATURE SET POINT. SHOULD SPACE TEMPERATURE CONTINUE TO FALL, BAS SHALL GENERATE AN ALARM. WHEN SPACE TEMPERATURE RISES TO 70 DEG F-ADJ, SPACE HEATING SEQUENCE SHALL STOP. HEATING HOT WATER CONTROL VALVE SHALL CLOSE. UNIT HEATER FAN MOTOR SHALL CONTINUE TO OPERATE FOR TEN MINUTES (ADJ.) FOLLOWING CLOSURE OF HEATING HOT WATER CONTROL VALVE AND THEN STOP.

1.4 ALL SET POINTS SHALL BE ADJUSTABLE.

1.5 COORDINATE REMOVAL OF UNIT HEATER, EXHAUST FAN AND ALL ASSOCIATED CONTROLS AND TURN OVER TO OWNER AT COMPLETION OF PHASE 4A/COMMISSIONING OF NEW GAS STORAGE ROOM IN PHASE 4A PROJECT AREA.

2 HOT WATER UNIT HEATER CONTROL (TEMP. GAS STORAGE RM. HEATING)

NTS



1. PENTHOUSE EQUIPMENT MODULE SERVICE CORRIDOR/MAINTENANCE ACCESS SPACE HEATING

1.1 BAS TO INCLUDE TWO TEMPERATURE SENSORS WITHIN THE PEM. ONE FOR EACH ACCESS AREA ON EACH SIDE OF THE AHU/AIR TUNNEL. EACH SENSOR WILL REPRESENT A TEMPERATURE CONTROL ZONE.

1.2 TWO UNIT HEATERS WILL BE PLACED ON EACH SIDE OF THE AHU/AIR TUNNEL (QTY 4 UNIT HEATERS). AN AIRFLOW CONTROL VALVE WITH HOT WATER REHEAT COIL WILL ALSO BE INSTALLED TO SERVE EACH SIDE OF THE AHU/AIR TUNNEL (QTY 2 AFCV'S WITH REHEAT). UNIT HEATERS AND AFCV SHALL BE GROUPED FOR OPERATION BASED ON THE SIDE OF THE AHU THEY DISCHARGE TO.

1.3 AIRFLOW CONTROL VALVES/REHEAT COILS SERVING THE PEM ACCESS AREAS/SERVICE CORRIDORS SHALL BE THE FIRST HEATING SOURCE FOR THE PEM IN ACCORDANCE WITH REHEAT TEMPERATURE CONTROL SEQUENCES INCLUDED WITH ZONE/SPACE CONTROLS DIAGRAMS (SEE M8.03 FOR ADDITIONAL INFORMATION). STEAM UNIT HEATERS REPRESENT FREEZE PROTECTION/BACK-UP HEATING FOR PEM.

1.4 UPON A BAS SYSTEM CALL FOR HEATING WITHIN THE PEM, THE BAS SHALL FIRST ENGAGE AIRFLOW CONTROL VALVE/REHEAT CONTROL SEQUENCE. IF SPACE TEMPERATURE CONTINUES TO DROP BELOW MINIMUM SET POINT (60 DEF F-ADJ), THE BAS SHALL MODULATE UNIT HEATER STEAM CONTROL VALVES AND ENGAGE UNIT HEATER FAN MOTORS TO MAINTAIN TEMPERATURE SET POINT. SHOULD SPACE TEMPERATURE CONTINUE TO FALL, BAS SHALL GENERATE AN ALARM. WHEN SPACE TEMPERATURE RISES TO 70 DEG F-ADJ, PEM SPACE HEATING SEQUENCE SHALL STOP. STEAM CONTROL VALVES SHALL CLOSE. UNIT HEATER FAN MOTORS SHALL CONTINUE TO OPERATE FOR TEN MINUTES (ADJ.) FOLLOWING CLOSURE OF STEAM CONTROL VALVES AND THEN STOP.

1.5 ALL SET POINTS SHALL BE ADJUSTABLE

3 STEAM UNIT HEATER CONTROL (PEM ACCESS AREAS BACK-UP HEATING)

NTS

100% CONSTRUCTION DOCUMENTS

FULLY SPRINKLERED

NO.	DESCRIPTION	DATE

CONSULTANTS:

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Drawing Title: MECHANICAL CONTROLS

Approved: Medical Center Director

Project Title: RENOVATE SURGICAL SERVICE & UPGRADE OPERATING ROOMS

Location: HUNTINGTON, WV

Date: 10.31.2014 | Checked: MPP | Drawn: JLR

Project Number: 581-13-101

Building Number: 1S

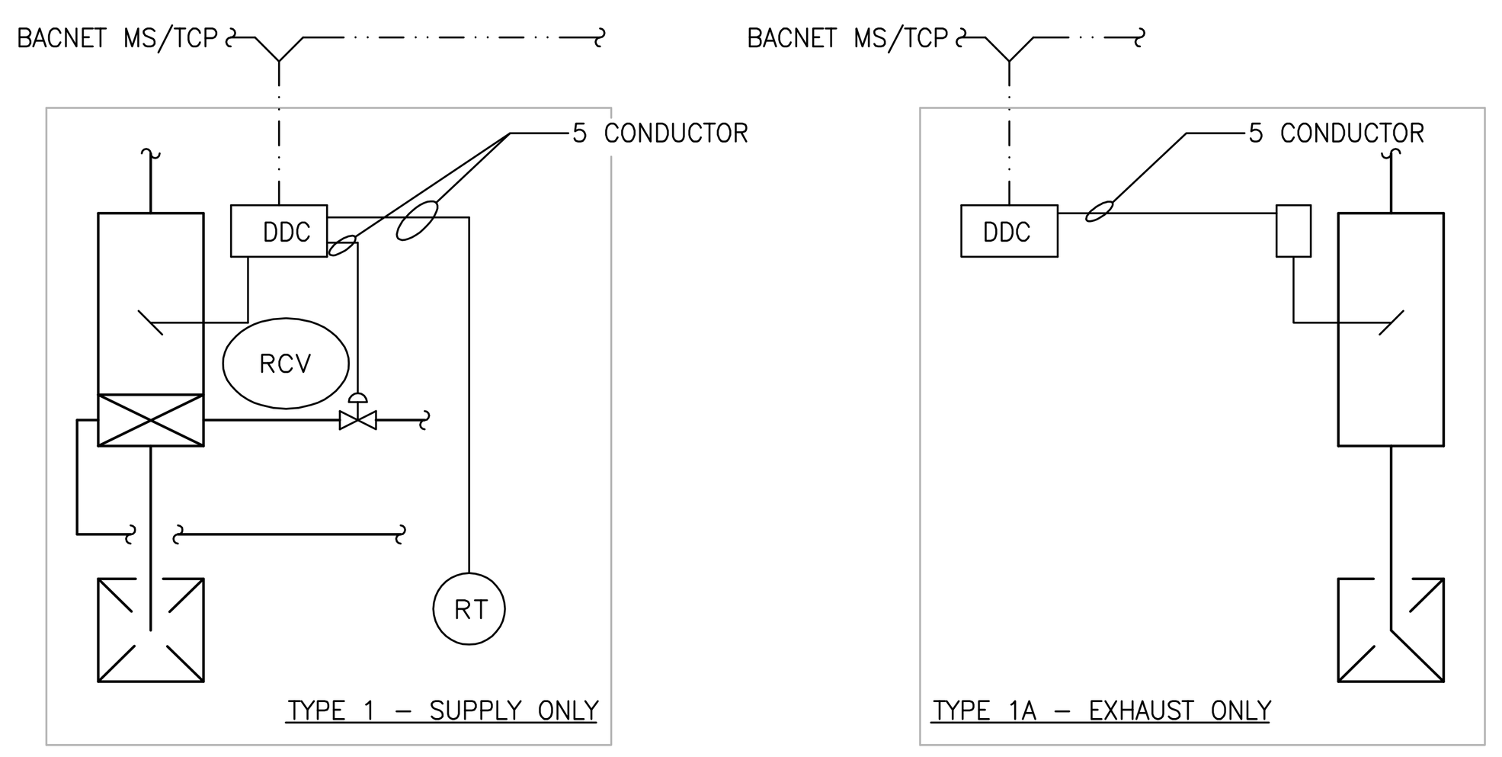
Drawing Number: M8.02

Dwg. 089 of 178

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



OCCUPIED / UNOCCUPIED SETPOINTS (ADJUSTABLE): SEE SETPOINTS SECTION ON THIS SHEET

ZONE TEMPERATURE SETPOINT ADJUST

1. SPACE OCCUPANTS SHALL BE ABLE TO MODIFY ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR. PROVIDE TWO DEGREE UP/DOWN (ADJUSTABLE). CONFIRM RANGE WITH VAMC.

NORMAL/OCCUPIED MODE

1. THE SUPPLY OR EXHAUST VARIABLE VOLUME AIRFLOW CONTROL VALVES (SAV/EAV) AND/OR AIR TERMINAL UNITS (TUS/TUE) SHALL SUPPLY OR EXHAUST A CONSTANT VOLUME OF AIR CONTINUOUSLY REGARDLESS OF VARIATIONS IN DUCT OR ROOM STATIC PRESSURE. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AIRFLOW.
2. FOR SUPPLY ONLY SPACES, THE ROOM TEMPERATURE SENSOR SHALL, THROUGH THE DDC, MODULATE THE DUCT–MOUNTED REHEAT COIL TWO WAY VALVE (RCV) TO MAINTAIN ROOM TEMPERATURE SETPOINT. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM SPACE TEMPERATURE. FOR OPERATING ROOMS, THE BAS SHALL ALSO ACTIVELY MONITOR HUMIDITY.

UNOCCUPIED MODE

1. WHEN INITIATED BY TIME OF DAY OR DAY OF THE WEEK AS COORDINATED WITH THE VAMC, THE BAS SHALL MODULATE THE SUPPLY AND EXHAUST AIRFLOW CONTROL VALVES AND/OR AIR TERMINAL UNIT TO THEIR SCHEDULED UNOCCUPIED AIRFLOWS. SPACES SHALL MAINTAIN DESIGN ROOM TRANSFER AIRFLOW/PRESSURE OFFSETS IN BOTH OCC AND UNOCC MODES. SHOULD ANY OF THE THE OPERATING ROOMS, PACU WING, PRE–OP WING AND/OR SURGICAL SUPPORT AREAS BE REQUIRED TO OPERATE "AFTER–HOURS" FOR NORMAL OCCUPIED MODE, THE BAS SHALL INCLUDE A LAEBELED/SECURED, KEY–ACTIVATED BAS PUSH BUTTON AT THE MAIN NURSE STATION WITHIN EACH WING (SEE PLAN FOR LOCATION) FOR EACH HVAC SYSTEM (AC–16, AC–8, AC–9, AC–10) TO OVERRIDE THE UNOCCUPIED MODE FOR A FIXED PERIOD OF TIME (1 HOUR – ADJUSTABLE).

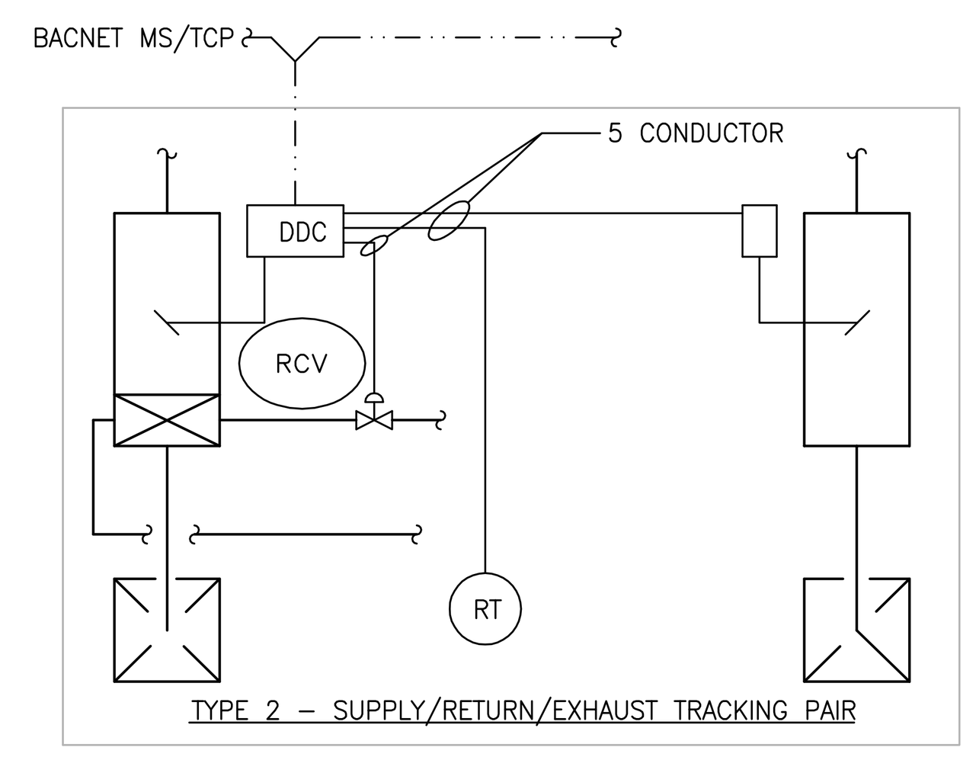
WARM–UP MODE

1. BASED UPON TIME OF DAY/DAY OF WEEK SCHEDULE COORDINATED/REVIEWED BY VAMC, THE BAS SHALL INITIATE A WARM UP CYCLE TO ENGAGE OCCUPIED MODE IN ADVANCE OF TYPICAL OCCUPIED HOURS (TIME ADJUSTABLE). BAS SHALL ENGAGE OCCUPIED MODE, INDEXING EACH CENTRAL AHU AND RF/EF, AS WELL AS ALL AIRFLOW CONTROL VALVES/AIR TERMINAL UNITS TO THE SCHEDULED OCCUPIED AIRFLOWS AND MODULATE REHEAT COIL CONTROL VALVES TO ACHIEVE OCCUPIED SPACE TEMPERATURES.

SMOKE PURGE MODE

1. FOR AIRFLOW CONTROL VALVES/AIR TERMINAL UNITS SERVING SPACES WITHIN THE SURGICAL SUITE (SUITE SERVED BY BOTH AC–16 & AC–8 – SEE DWG. M7.00). WHEN SMOKE IS DETECTED WITHIN THE SUITE AS PROVEN BY SUITE FIRE ALARM DEVICE OR THE MAIN DUCT SMOKE DETECTOR AT THE INLET PLENUM TO THE RETURN FANS (RF–16A/16B) WITHIN THE PENTHOUSE EQUIPMENT ROOM (PEM), THE BAS SHALL INDEX ALL AIRFLOW CONTROL VALVES SERVING EACH SPACE TO THEIR SCHEDULED SMOKE PURGE AIRFLOWS. SPACES SHALL BE PROVEN TO ACHIEVE NEUTRAL PRESSURE OFFSETS IN SMOKE PURGE MODE AS PER SCHEDULES AND SEQUENCES OF OPERATION.

1 ZONE CONTROL TYPE 1 & TYPE 1A
NTS



OCCUPIED / UNOCCUPIED SETPOINTS (ADJUSTABLE): SEE SETPOINTS SECTION ON THIS SHEET

ZONE TEMPERATURE SETPOINT ADJUST

1. SPACE OCCUPANTS SHALL BE ABLE TO MODIFY ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR. PROVIDE TWO DEGREE UP/DOWN (ADJUSTABLE). CONFIRM RANGE WITH VAMC.

NORMAL/OCCUPIED MODE

1. THE SUPPLY VARIABLE VOLUME AIRFLOW CONTROL VALVE (SAV) OR AIR TERMINAL UNIT (TUS) SHALL SUPPLY A CONSTANT VOLUME OF AIR CONTINUOUSLY REGARDLESS OF VARIATIONS IN DUCT OR ROOM STATIC PRESSURE. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM SUPPLY AIRFLOW AND USE FOR OFFSET CONTROL OF RETURN/EXHAUST.
2. THE ROOM TEMPERATURE SENSOR SHALL, THROUGH THE DDC, MODULATE THE DUCT–MOUNTED REHEAT COIL TWO WAY VALVE (RCV) TO MAINTAIN ROOM TEMPERATURE SETPOINT.
3. THE RETURN/EXHAUST VARIABLE VOLUME AIRFLOW CONTROL VALVE (RAV/EAV) OR AIR TERMINAL UNIT (TUR/TUE) SHALL TRACK THE SUPPLY SAV/TUS PLUS OR MINUS THE CFM DIFFERENTIAL SCHEDULED.

UNOCCUPIED MODE

1. WHEN INITIATED BY TIME OF DAY OR DAY OF THE WEEK AS COORDINATED WITH THE VAMC, THE BAS SHALL MODULATE THE SUPPLY AND EXHAUST AIRFLOW CONTROL VALVES AND/OR AIR TERMINAL UNIT TO THEIR SCHEDULED UNOCCUPIED AIRFLOWS. SPACES SHALL MAINTAIN DESIGN ROOM TRANSFER AIRFLOW/PRESSURE OFFSETS IN BOTH OCC AND UNOCC MODES. SHOULD ANY OF THE THE OPERATING ROOMS, PACU WING, PRE–OP WING AND/OR SURGICAL SUPPORT AREAS BE REQUIRED TO OPERATE "AFTER–HOURS" FOR NORMAL OCCUPIED MODE, THE BAS SHALL INCLUDE A LAEBELED/SECURED, KEY–ACTIVATED BAS PUSH BUTTON AT THE MAIN NURSE STATION WITHIN EACH WING (SEE PLAN FOR LOCATION) FOR EACH HVAC SYSTEM (AC–16, AC–8, AC–9, AC–10) TO OVERRIDE THE UNOCCUPIED MODE FOR A FIXED PERIOD OF TIME (1 HOUR – ADJUSTABLE).

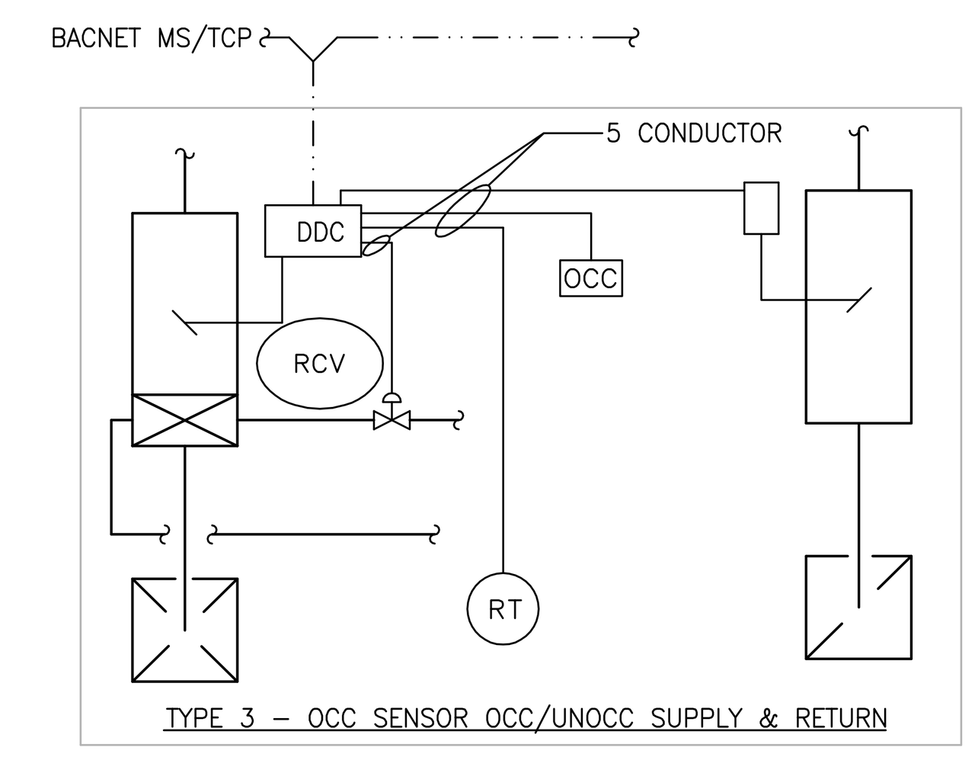
WARM–UP MODE

1. BASED UPON TIME OF DAY/DAY OF WEEK SCHEDULE COORDINATED/REVIEWED BY VAMC, THE BAS SHALL INITIATE A WARM UP CYCLE TO ENGAGE OCCUPIED MODE IN ADVANCE OF TYPICAL OCCUPIED HOURS (TIME ADJUSTABLE). BAS SHALL ENGAGE OCCUPIED MODE, INDEXING CENTRAL AHU AND EF, AS WELL AS ALL AIRFLOW CONTROL VALVES TO THE SCHEDULED OCCUPIED AIRFLOWS AND MODULATE REHEAT COIL CONTROL VALVES TO ACHIEVE OCCUPIED SPACE TEMPERATURES.

SMOKE PURGE MODE

1. FOR AIRFLOW CONTROL VALVES/AIR TERMINAL UNITS SERVING SPACES WITHIN THE SURGICAL SUITE (SUITE SERVED BY BOTH AC–16 & AC–8 – SEE DWG. M7.00). WHEN SMOKE IS DETECTED WITHIN THE SUITE AS PROVEN BY SUITE FIRE ALARM DEVICE OR THE MAIN DUCT SMOKE DETECTOR AT THE INLET PLENUM TO THE RETURN FANS (RF–16A/16B) WITHIN THE PENTHOUSE EQUIPMENT ROOM (PEM), THE BAS SHALL INDEX ALL AIRFLOW CONTROL VALVES SERVING EACH SPACE TO THEIR SCHEDULED SMOKE PURGE AIRFLOWS. SPACES SHALL BE PROVEN TO ACHIEVE NEUTRAL PRESSURE OFFSETS IN SMOKE PURGE MODE AS PER SCHEDULES AND SEQUENCES OF OPERATION.

2 ZONE CONTROL TYPE 2
NTS



OCCUPIED / UNOCCUPIED SETPOINTS (ADJUSTABLE): SEE SETPOINTS SECTION ON THIS SHEET

ZONE TEMPERATURE SETPOINT ADJUST

1. SPACE OCCUPANTS SHALL BE ABLE TO MODIFY ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR. PROVIDE TWO DEGREE UP/DOWN (ADJUSTABLE). CONFIRM RANGE WITH VAMC.

NORMAL/OCCUPIED MODE

1. THE SUPPLY AND RETURN VARIABLE VOLUME AIR TERMINAL UNITS SHALL MAINTAIN A CONSTANT VOLUME OF AIR CONTINUOUSLY REGARDLESS OF VARIATIONS IN DUCT OR ROOM STATIC PRESSURE. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AIRFLOW.
2. THE ROOM TEMPERATURE SENSOR SHALL, THROUGH THE DDC, MODULATE THE DUCT–MOUNTED REHEAT COIL TWO WAY VALVE (RCV) TO MAINTAIN ROOM TEMPERATURE SETPOINT. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM SPACE TEMPERATURE.

UNOCCUPIED MODE

1. WHEN INITIATED BY SPACE OCCUPANCY SENSOR INDICATION THAT ROOM IS UNOCCUPIED, OR BY TIME OF DAY/DAY OF THE WEEK AS COORDINATED WITH THE VAMC BUILDING OCCUPANCY SCHEDULE, THE BAS SHALL MODULATE THE SUPPLY AIR TERMINAL UNIT(S) TO THEIR SCHEDULED UNOCCUPIED AIRFLOWS. SUITE SHALL MAINTAIN DESIGN ROOM TRANSFER AIRFLOW/PRESSURE OFFSETS AND PRESSURIZATION WITH RESPECT TO REFERENCE/OUTDOOR PRESSURE IN BOTH OCC AND UNOCC MODES. SHOULD ANY INDIVIDUAL OFFICE/ADMIN SPACE BE REQUIRED TO OPERATE "AFTER–HOURS" FOR NORMAL OCCUPIED MODE, THE BAS SHALL ACCEPT INPUT FROM THE SPACE LOCAL OCCUPANCY SENSOR TO ALLOW LOCALIZED OVERRIDE OF THE UNOCCUPIED MODE FOR THE TUS/RHC SERVING THAT SPACE FOR A FIXED PERIOD OF TIME (1 HOUR – ADJUSTABLE), WHILE KEEPING ALL OTHER SPACES IN UNOCC MODE.

WARM–UP MODE

1. BASED UPON TIME OF DAY/DAY OF WEEK SCHEDULE COORDINATED/REVIEWED BY VAMC, THE BAS SHALL INITIATE A WARM UP CYCLE TO ENGAGE OCCUPIED MODE IN ADVANCE OF TYPICAL OCCUPIED HOURS (TIME ADJUSTABLE). BAS SHALL ENGAGE OCCUPIED MODE, INDEXING CENTRAL AHU AND RF, AS WELL AS ALL AIR TERMINAL UNITS TO THE SCHEDULED OCCUPIED AIRFLOWS AND MODULATE REHEAT COIL CONTROL VALVES TO ACHIEVE OCCUPIED SPACE TEMPERATURES.

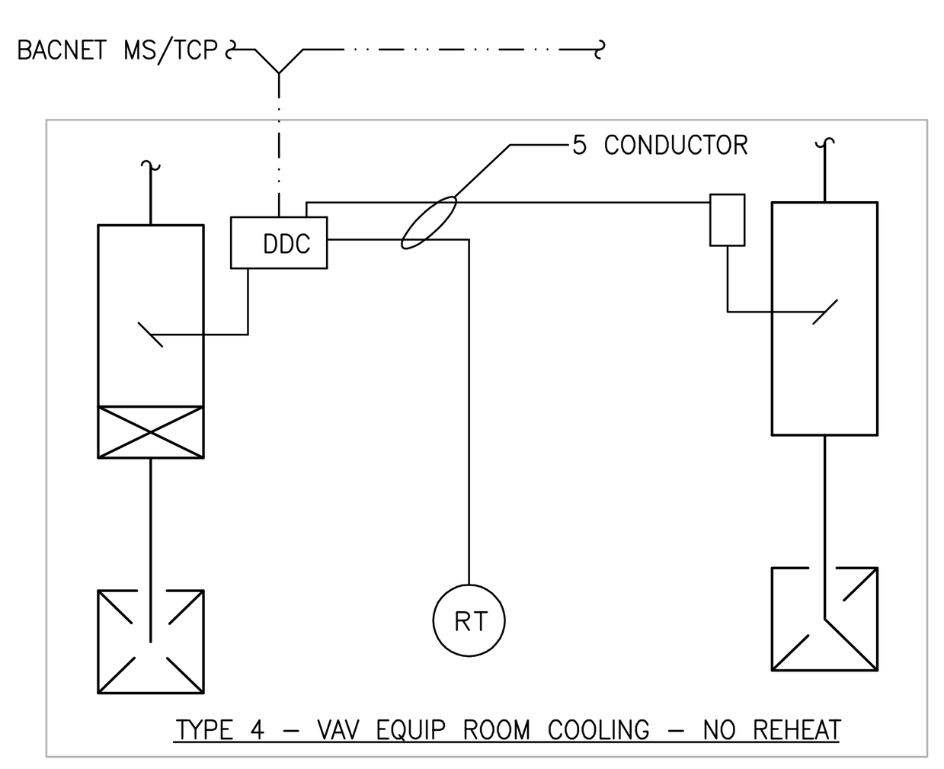
LOSS OF NORMAL POWER/FAILURE MODE

1. WHEN SURGICAL SUPPORT ADMINISTRATIVE AREAS EXPERIENCE A LOSS OF NORMAL POWER, IF THE HVAC EQUIPMENT SERVING THE AREA IS ON EMERGENCY POWER, RESPECTIVE AIR TERMINAL UNITS/REHEAT COIL CONTROL VALVES SHALL CONTINUE TO OPERATE ACCORDING TO THE CURRENT OPERATION MODE. AIR TERMINAL UNITS AND REHEAT COIL CONTROL VALVES ASSOCIATED WITH HVAC EQUIPMENT ON NORMAL POWER SHALL FAIL IN LAST POSITION, AWAITING RESTORATION OF NORMAL POWER. DESIGN INTENT IS FOR HVAC EQUIPMENT AND SYSTEMS SERVING THE SURGERY ADMIN SUITE TO BE ABLE TO RESTART AUTOMATICALLY ONCE NORMAL POWER IS RESTORED.

3 ZONE CONTROL TYPE 3 - SURGICAL SUPPORT ADMIN AREAS
NTS

GENERAL SHEET NOTES:

1. SEE DWG. M0.01, M0.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE.
3. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM–UP OPERATIONAL MODES. REVIEW AND CONFIRM ALL NEW AND EXISTING HVAC EQUIPMENT, (AC–8/EF–8, AC–9/RF–9, AC–10/EF–10 AND EF–16) AND CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED HEREIN. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING OUTDOOR AIR, SUPPLY, RETURN AND EXHAUST AIRFLOW MEASUREMENT AND OFFSET CONTROL VALUES FROM TOTAL SUPPLY AIRFLOW QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED.
4. BAS CONTRACTOR SHALL VERIFY AND DOCUMENT LOCATION OF ALL EXISTING TO REMAIN/RE–USED/RE–CALIBRATED SENSORS PRIOR TO BEGINNING OF PROJECT/DEMOLITION EFFORTS. REVIEW CONDITION OF THESE SENSING DEVICES AND SALVAGE/REUSE/RECALIBRATE IF POSSIBLE, OTHERWISE REPLACE FOR NEW CONSTRUCTION AS REQUIRED. COORDINATE MOUNTING AND LOCATION OF ALL SENSORS WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC AS REQUIRED. IDENTIFY LOCATION ON PLANS/CONTROLS SUBMITTAL FOR VAMC RECORD DOCUMENTS/KNOWLEDGE AND INCLUDE WITH O&M SUBMISSION FOR CONTROLS AND SEQUENCES OF OPERATION.
5. COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM–UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF ALL SPACE OCCUPANCY SENSORS AND THE DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN INDIVIDUALS SPACES AND/OR THE ENTIRE SUITE IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY.
6. COORDINATE FINAL LOCATIONS OF SPACE REFERENCE PRESSURE SENSORS, PRESSURE MONITORS, PRESSURIZATION ALARM OVERRIDE KEY–SWTICHES, ROOM THERMOSTATS/TEMPERATURE SENSORS, HUMIDITY SENSORS, OCCUPANCY SENSORS, UNOCCUPIED OVERRIDE PUSH BUTTONS AND OTHER WALL–MOUNTED CONTROLS DEVICES AS PER PLAN DRAWINGS, SPECIFICATIONS AND VAMC SITE ENGINEERING PERSONNEL REVIEW.
7. REFER TO ELECTRICAL PLANS AND COORDINATE POWER SOURCE FOR NEW HVAC EQUIPMENT AND FOR ALL BAS CONTROLS / CONTROL PANEL(S) AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR BAS CONTROL AND BAS TO REMAIN OPERATIONAL WHILE HVAC SYSTEMS AND EQUIPMENT ON EMERGENCY POWER REMAIN OPERATIONAL AND WHILE HVAC SYSTEMS AND EQUIPMENT ON NORMAL POWER SHUTDOWN. FOR EXAMPLE, EXISTING AIR HANDLING UNITS, AC–8/AC–10 AND EXHAUST FANS, EF–8/EF–10/EF–16 HAVE BEEN POWERED FROM EMERGENCY POWER SOURCE. THEREFORE, AIR FLOW CONTROL VALVES/AIR TERMINAL UNITS, HYDRONIC CONTROL VALVES AND ASSOCIATED BAS CONTROLS/CONTROL PANELS SHALL ALSO BE POWERED BY EMERGENCY POWER. HVAC EQUIPMENT SHALL RE–START AUTOMATICALLY DURING TRANSITION BACK TO NORMAL POWER. COORDINATE FINAL HVAC EQUIPMENT RESTART SEQUENCE/PRIORTIZATION WITH VAMC SITE ENGINEERING PERSONNEL.
8. REFER TO DETAIL SHEETS AND ALL CONTROL DIAGRAMS FOR ADDITIONAL CONTROLS REQUIREMENTS ASSOCIATED WITH PEM, AHU, SMOKE DAMPERS AND REHEAT COIL INSTALLATIONS, ETC.



OCCUPIED / UNOCCUPIED SETPOINTS (ADJUSTABLE): SETPOINTS CONSTANT – 72 DEG F, MAX 60% RH, MIN 20% RH

ZONE TEMPERATURE SETPOINT ADJUST

1. VAMC SITE ENGINEERING SHALL BE ABLE TO MODIFY ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR WITHIN EACH SPACE. PROVIDE TWO DEGREE UP/DOWN (ADJUSTABLE). CONFIRM RANGE WITH VAMC.

NORMAL/OCCUPIED MODE

1. THE SUPPLY VARIABLE VOLUME AIRFLOW CONTROL VALVE (SAV) OR AIR TERMINAL UNIT (TUS) SHALL CONTINUOUSLY MAINTAIN THE REQUIRED VOLUME OF SUPPLY AIR TO SATISFY THE INTERNAL HEAT GAIN WITHIN EACH SPACE, MAINTAINING SPACE SET POINT TEMPERATURE, REGARDLESS OF VARIATIONS IN DUCT OR ROOM STATIC PRESSURE. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AIRFLOW.
2. THE ROOM TEMPERATURE SENSOR SHALL, THROUGH THE DDC, MODULATE THE VARIABLE VOLUME SUPPLY (SAV/TUS) BETWEEN THE MAXIMUM AND MINIMUM SCHEDULED AIRFLOW VALUES (CFM) TO MAINTAIN ROOM TEMPERATURE SET POINT. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM SPACE TEMPERATURE.
3. THE EXHAUST VARIABLE VOLUME AIRFLOW CONTROL VALVE (EAV) OR AIR TERMINAL UNIT (TUE) SHALL TRACK THE SUPPLY SAV/TUS PLUS OR MINUS THE CFM DIFFERENTIAL SCHEDULED.

UNOCCUPIED MODE

1. VAV OPERATION TO SATISFY SPACE TEMPERATURE REQUIREMENTS/MEET INTERNAL LOADS SHALL BE CONTINUOUS.

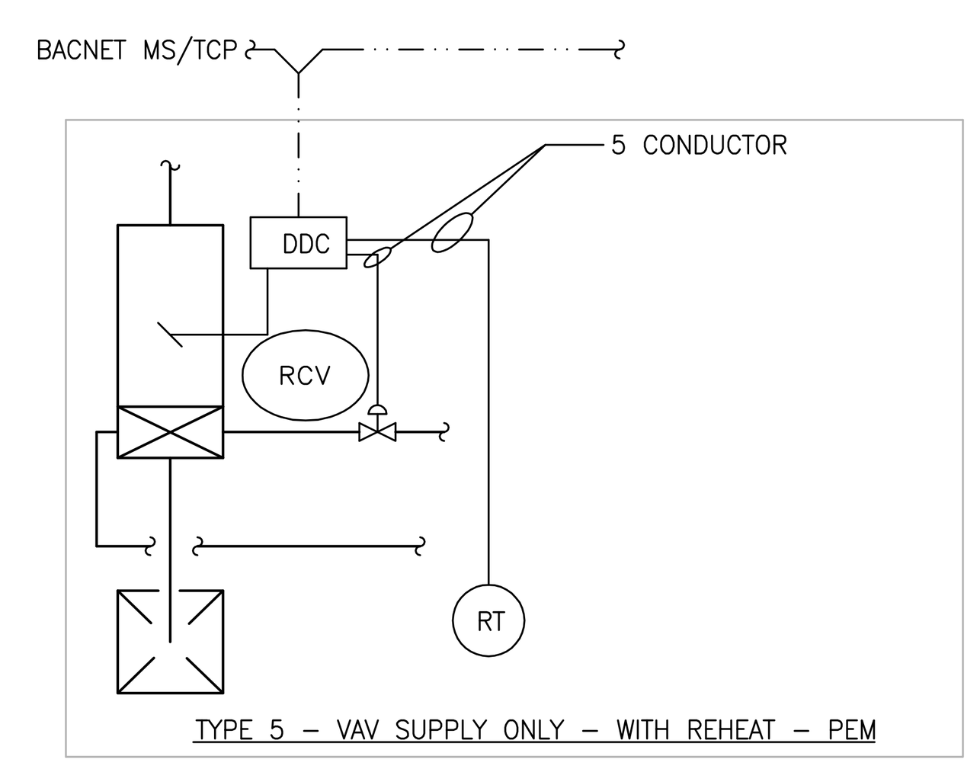
WARM–UP MODE

1. VAV OPERATION TO SATISFY SPACE TEMPERATURE REQUIREMENTS/MEET INTERNAL LOADS SHALL BE CONTINUOUS.

LOSS OF NORMAL POWER/FAILURE MODE

1. THE HVAC EQUIPMENT SERVING THE EQUIPMENT ROOMS IS ON EMERGENCY POWER (AC–16. AC–8, EF–8), THEREFORE THE DESIGN INTENT IS THAT THE RESPECTIVE AIR TERMINAL UNITS/BAS CONTROLS SHALL CONTINUE TO OPERATE ACCORDING TO THEIR CONTINUOUS VAV OPERATION MODE. DESIGN INTENT IS FOR HVAC EQUIPMENT AND SYSTEMS SERVING THE EQUIPMENT AREAS (IT–DATA–TEL–ELECTRICAL) TO BE ABLE TO OPERATE CONTINUOUSLY IN ORDER TO COOL THESE SPACES.

4 ZONE CONTROL TYPE 4 - VAV EQUIP ROOM COOLING (NO REHEAT)
NTS



OCCUPIED / UNOCCUPIED SETPOINTS (ADJUSTABLE): SETPOINTS: SUMMER: 78 DEG F/60% RH, WINTER: 65 DEG F/20% RH.

ZONE TEMPERATURE SETPOINT ADJUST

1. VAMC SITE ENGINEERING SHALL BE ABLE TO MODIFY ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR WITHIN EACH SIDE OF THE PEM EQUIPMENT ACCESS AREA. PROVIDE TWO DEGREE UP/DOWN (ADJUSTABLE). CONFIRM RANGE WITH VAMC.

NORMAL/OCCUPIED MODE

1. THE SUPPLY VARIABLE VOLUME AIRFLOW CONTROL VALVE (SAV) SHALL CONTINUOUSLY MAINTAIN THE REQUIRED VOLUME OF SUPPLY AIR TO SATISFY THE INTERNAL HEAT GAIN WITHIN EACH SIDE OF THE PEM ACCESS AREA, MAINTAINING SET POINT TEMPERATURE, REGARDLESS OF VARIATIONS IN DUCT OR ZONE STATIC PRESSURE. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AIRFLOW.
2. THE AREA TEMPERATURE SENSOR SHALL, THROUGH THE DDC, MODULATE THE VARIABLE VOLUME SUPPLY (SAV) BETWEEN THE MAXIMUM AND MINIMUM SCHEDULED AIRFLOW VALUES (CFM) TO MAINTAIN ROOM TEMPERATURE SET POINT. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AREA TEMPERATURE.
3. WHEN ZONE HEATING IS REQUIRED/DURING THE WINTER SEASON, AREA TEMPERATURE SENSOR SHALL ALSO, THROUGH THE DDC, MODULATE THE DUCT–MOUNTED REHEAT COIL TWO WAY VALVE (RCV) TO MAINTAIN AREA TEMPERATURE SETPOINT. THE BAS SHALL ACTIVELY MEASURE, MONITOR AND ALARM AREA TEMPERATURE.
4. PEM EQUIPMENT ACCESS AREA SHALL INCLUDE A PRESSURE RELIEF/BAROMETRIC DAMPER TO ALLOW THE PEM EQUIPMENT ACCESS AREA TO POSITIVELY PRESSURIZE WITH RESPECT TO OUTDOORS.

UNOCCUPIED MODE

1. VAV OPERATION TO SATISFY SPACE TEMPERATURE REQUIREMENTS/MEET INTERNAL LOADS SHALL BE CONTINUOUS.

WARM–UP MODE

1. VAV OPERATION TO SATISFY SPACE TEMPERATURE REQUIREMENTS/MEET INTERNAL LOADS SHALL BE CONTINUOUS.

LOSS OF NORMAL POWER/FAILURE MODE

1. THE HVAC EQUIPMENT SERVING THE PEM ACCESS AREAS IS ON EMERGENCY POWER AND INCLUDES REDUNDANT SUPPLY/RETURN FANS (AC–16), THEREFORE THE DESIGN INTENT IS THAT THE RESPECTIVE AIRFLOW CONTROL VALVES/REHEAT COILS/BAS CONTROLS SHALL CONTINUE TO OPERATE ACCORDING TO THEIR CONTINUOUS VAV–WITH–REHEAT OPERATION MODE. DESIGN INTENT IS FOR HVAC EQUIPMENT AND SYSTEMS SERVING THE PEM ACCESS AREAS TO OPERATE CONTINUOUSLY TO PROVIDE HEATING & COOLING. PEM EQUIPMENT ACCESS AREAS ALSO INCLUDE STEAM UNIT HEATERS AS BACK–UP HEATING/FREEZE PROTECTION IN THE EVENT THAT AHU–16 TRIPS OFF COMPLETELY/A LOSS OF AIRFLOW PREVENTS HEATING OF THE PEM EQUIPMENT ACCESS AREAS VIA THE VAV AIRFLOW CONTROL VALVES.

5 ZONE CONTROL TYPE 5 - VAV SUPPLY ONLY - PEM
NTS

A. SETPOINTS / DESIGN / SPACE CRITERIA

NOTES:

SITE ELEVATION FOR HUNTINGTON, WV: 837 FEET ABOVE SEA LEVEL

UNOCCUPIED MODE IN COOLING SEASON ALLOWS SPACE TEMPERATURES TO RISE TO SET POINT INDICATED WITHOUT ADDITION OF HEAT VIA REHEAT CONTROL SEQUENCE. SIMILARLY UNOCCUPIED MODE IN HEATING SEASON ALLOWS SPACE TEMPERATURES TO DROP TO SET POINT INDICATED WITHOUT ADDITION OF COOLING/ADDITIONAL AIRFLOW.

ALL SET POINTS ADJUSTABLE

• OPERATING/CYSTOSCOPIC ROOMS INDOOR TEMPERATURE:	66°F COOLING 75°F HEATING
• OPERATING/CYSTOSCOPIC ROOMS INDOOR RELATIVE HUMIDITY:	60% MAX 25% MIN
• PACU/PRE–OP/ISOLATION ROOMS/ALL SURGICAL SUPPORT/ OFFICE/ADMIN INDOOR TEMPERATURE:	75°F COOLING 70°F HEATING
• PACU/PRE–OP/ISOLATION ROOMS/ALL SURGICAL SUPPORT/ OFFICE/ADMIN INDOOR RELATIVE HUMIDITY:	60% MAX 20% MIN
• UNOCCUPIED MODE INDOOR TEMPERATURE (ALL SPACES):	80°F COOLING 65°F HEATING
• UNOCCUPIED MODE INDOOR RELATIVE HUMIDITY (ALL SPACES):	60% MAX 20% MIN
• OPERATING/CYSTOSCOPIC ROOMS MINIMUM OUTDOOR AIR:	4 AIR CHANGES/HR
• PACU/PRE–OP/ISOLATION ROOMS/ALL SURGICAL SUPPORT/ OFFICE/ADMIN MINIMUM OUTDOOR AIR:	2 AIR CHANGES/HR
• OPERATING/CYSTOSCOPIC ROOMS MINIMUM TOTAL AIRFLOW: SEE AIRFLOW CONTROL VALVE SCHEDULES FOR AIRFLOW (CFM)	20 AIR CHANGES/HR
• PACU/PRE–OP/ISOLATION ROOMS/ALL SURGICAL SUPPORT/ OFFICE/ADMIN MINIMUM TOTAL AIRFLOW:	VARIES–SEE SCHEDULES
• TOILET ROOMS MINIMUM TOTAL AIRFLOW:	10 AIR CHANGES/HR

6 SETPOINTS - ADJUSTABLE
NTS

100% CONSTRUCTION DOCUMENTS
FULLY SPRINKLERED

NO.	DESCRIPTION	DATE

CONSULTANTS:

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
THOMAS L. CHAPMAN
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Drawing Title	MECHANICAL CONTROLS
Approved: Medical Center Director	
Project Title	RENOVATE SURGICAL SERVICE & UPGRADE OPERATING ROOMS
Location	HUNTINGTON, WV
Date	10.31.2014
Checked	MPP
Drawn	JLR
Project Number	581-13-101
Building Number	1S
Drawing Number	M8.03
Dwg.	090 of 178

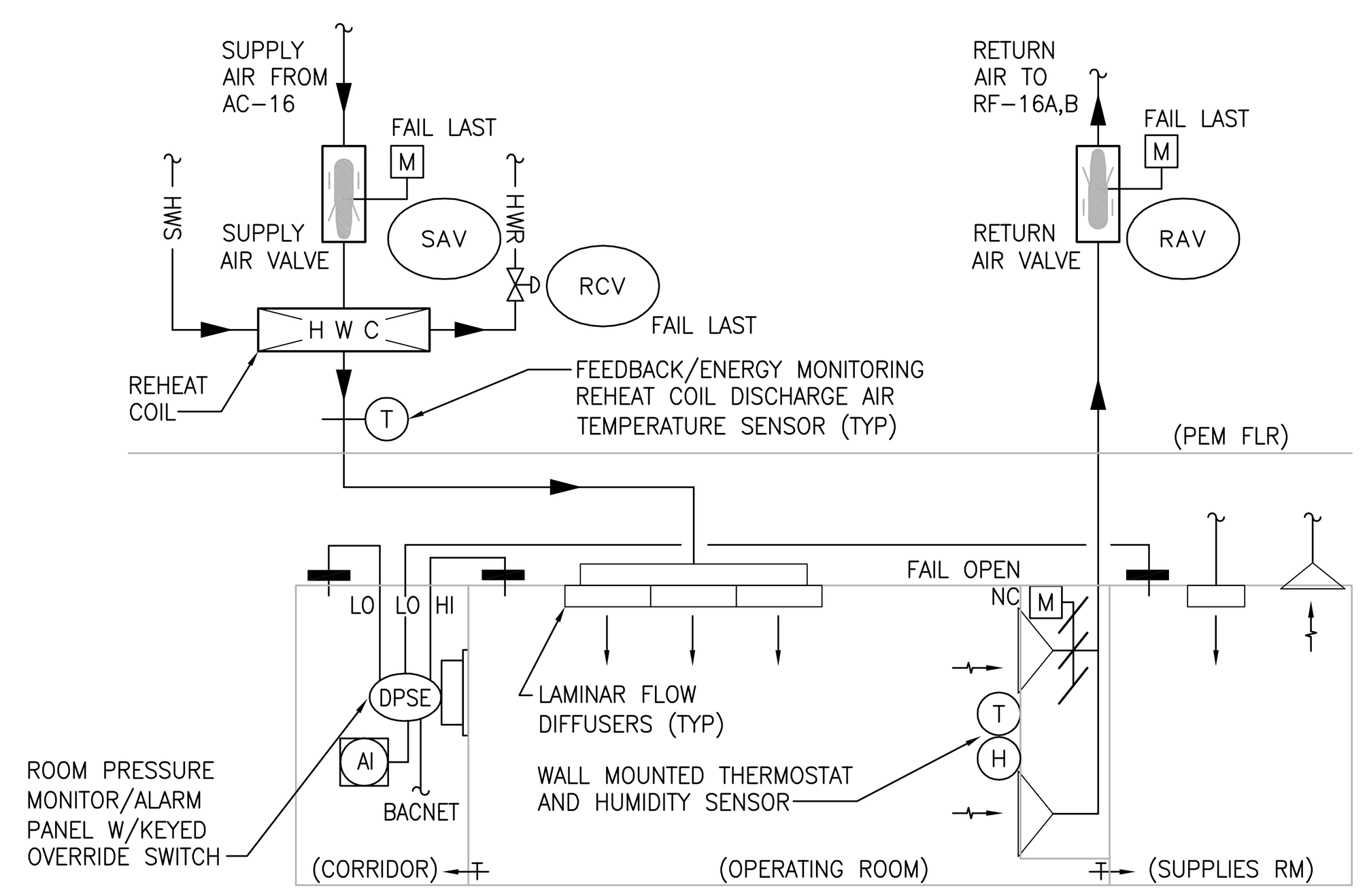
Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

GENERAL SHEET NOTES:

1. SEE DWG. M0.01, M0.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE.
3. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP OPERATIONAL MODES. REVIEW AND CONFIRM ALL NEW AND EXISTING HVAC EQUIPMENT, (AC-8/EF-8, AC-9/RF-9, AC-10/EF-10 AND EF-16) AND CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED HEREIN. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING OUTDOOR AIR, SUPPLY, RETURN AND EXHAUST AIRFLOW MEASUREMENT AND OFFSET CONTROL VALUES FROM TOTAL SUPPLY AIRFLOW QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED.
4. BAS CONTRACTOR SHALL VERIFY AND DOCUMENT LOCATION OF ALL EXISTING TO REMAIN/RE-USED/RE-CALIBRATED SENSORS PRIOR TO BEGINNING OF PROJECT/DEMOLITION EFFORTS. REVIEW CONDITION OF THESE SENSING DEVICES AND SALVAGE/REUSE/RECALIBRATE IF POSSIBLE, OTHERWISE REPLACE FOR NEW CONSTRUCTION AS REQUIRED. COORDINATE MOUNTING AND LOCATION OF ALL SENSORS WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC AS REQUIRED. IDENTIFY LOCATION ON PLANS/CONTROLS SUBMITTAL FOR VAMC RECORD DOCUMENTS/KNOWLEDGE AND INCLUDE WITH O&M SUBMISSION FOR CONTROLS AND SEQUENCES OF OPERATION.
5. COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF ALL SPACE OCCUPANCY SENSORS AND THE DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN INDIVIDUALS SPACES AND/OR THE ENTIRE SUITE IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY.
6. COORDINATE FINAL LOCATIONS OF SPACE REFERENCE PRESSURE SENSORS, PRESSURE MONITORS, PRESSURIZATION ALARM OVERRIDE KEY-SWTICHES, ROOM THERMOSTATS/TEMPERATURE SENSORS, HUMIDITY SENSORS, OCCUPANCY SENSORS, UNOCCUPIED OVERRIDE PUSH BUTTONS AND OTHER WALL-MOUNTED CONTROLS DEVICES AS PER PLAN DRAWINGS, SPECIFICATIONS AND VAMC SITE ENGINEERING PERSONNEL REVIEW.
7. REFER TO ELECTRICAL PLANS AND COORDINATE POWER SOURCE FOR NEW HVAC EQUIPMENT AND FOR ALL BAS CONTROLS / CONTROL PANEL(S) AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR BAS CONTROL AND BAS TO REMAIN OPERATIONAL WHILE HVAC SYSTEMS AND EQUIPMENT ON EMERGENCY POWER REMAIN OPERATIONAL AND WHILE HVAC SYSTEMS AND EQUIPMENT ON NORMAL POWER SHUTDOWN. FOR EXAMPLE, EXISTING AIR HANDLING UNITS, AC-8/AC-10 AND EXHAUST FANS, EF-8/EF-10/EF-16 HAVE BEEN POWERED FROM EMERGENCY POWER SOURCE. THEREFORE, AIR FLOW CONTROL VALVES/AIR TERMINAL UNITS, HYDRONIC CONTROL VALVES AND ASSOCIATED BAS CONTROLS/CONTROL PANELS SHALL ALSO BE POWERED BY EMERGENCY POWER. HVAC EQUIPMENT SHALL RE-START AUTOMATICALLY DURING TRANSITION BACK TO NORMAL POWER. COORDINATE FINAL HVAC EQUIPMENT RESTART SEQUENCE/PRIORTIZATION WITH VAMC SITE ENGINEERING PERSONNEL.
8. REFER TO DETAIL SHEETS AND ALL CONTROL DIAGRAMS FOR ADDITIONAL CONTROLS REQUIREMENTS ASSOCIATED WITH PEM, AHU, SMOKE DAMPERS AND REHEAT COIL INSTALLATIONS, ETC.



A. THE SUPPLY AND RETURN AIR FLOW CONTROL VALVES (ACCUVALVES) SHALL BE PRESSURE INDEPENDENT AND SHALL MAINTAIN CONSTANT AIR FLOW BASED UPON THE ENGAGED OPERATIONAL SEQUENCE FOR THE THIRD FLOOR NEW SURGICAL OPERATING ROOM SUITES (OCC/UNOCC/SMOKE PURGE/WARM-UP MODES). A DIFFERENTIAL BETWEEN THE SUPPLY AND RETURN (AS NOTED ON DWG M7.00) SHALL BE MAINTAINED TO INSURE PRESSURIZATION IN THE SPACES AT ALL TIMES. SPACES SHALL BE NEUTRAL TO ADJACENCIES DURING SMOKE PURGE, BUT POSITIVE FOR ALL OTHER MODES. SEE AIRFLOW CONTROL VALVE SCHEDULE FOR MORE INFO.

B. AIR QUANTITIES FOR ALL AIRFLOW CONTROL VALVES SHALL BE FULLY ADJUSTABLE WITHIN THE BAS. SUPPLY AND EXHAUST AIRFLOW, ROOM TEMPERATURE, ROOM HUMIDITY AND ROOM PRESSURE SHALL BE MEASURED, MONITORED AND ALARMED WITHIN THE BAS FOR EACH SPACE.

C. POSITIVE PRESSURE/STERILE OPERATING ROOMS SHALL INCLUDE ACTIVE ROOM PRESSURE MONITORING WITH LOCAL AND BAS MEASUREMENT, MONITORING AND ALARM. LOCAL ROOM PRESSURE MONITOR PANELS (TSI OR APPROVED EQUAL-SEE PLANS FOR LOCATIONS) SHALL INCLUDE KEY SWITCH TO ALLOW LOCAL AND REMOTE/BAS ALARMS TO BE DISABLED WHEN SPACES ARE BEING CLEANED/AFTER-HOURS/DURING PERIODS OF NON-USE/UNOCCUPIED. BAS OPERATING MODE IS NOT CHANGED AS SPACES CONTINUE TO MAINTAIN CONSTANT VOLUME AIRFLOW PER THE ACTIVE SEQUENCE (OCC/UNOCC/SMOKE PURGE). BAS CONTINUES TO MONITOR PRESSURE, ONLY THE ALARMS ARE DISENGAGED TO ALLOW FOR ROOM CLEANING, DOOR OPENINGS, ETC. BASED ON VAMC STANDARD OPERATING PROCEDURES/QUALIFIED PERSONNEL USE OF THE KEY/KEY SWITCHES. BAS CONTRACTOR SHALL ASSIST IN THE VERIFICATION AND DOCUMENTATION OF ALL OPERATION MODES AND CONFIRM THAT POSITIVE PRESSURE/STERILE OPERATING ROOMS MAINTAIN POSITIVE AIRFLOW OFFSETS AS SCHEDULED AND AS INDICATED ON DRAWING M7.00. SPACES SHALL BE NEUTRAL TO ADJACENCIES DURING SMOKE PURGE.

D. THE OPERATING ROOM TEMPERATURE SENSORS SHALL PROVIDE REHEAT COIL CONTROL AS DESCRIBED IN AIRFLOW CONTROL VALVE SEQUENCES. HUMIDITY SENSORS ARE FOR FEEDBACK MONITORING AS INDIVIDUAL OPERATING ROOM HUMIDITY CONTROL IS NOT REQUIRED/PROVIDED IN DESIGN.

DIFFERENTIAL PRESSURE MONITOR/ALARM SEQUENCE OF OPERATION OPERATING ROOMS)

1. GENERAL

A. DIFFERENTIAL PRESSURE BETWEEN POSITIVE PRESSURE OPERATING ROOMS AND ADJACENT SURGICAL SUITE CORRIDOR, SURGICAL SUPPLIES ROOMS AND CLEAN CORE AREAS (OR-6) SHALL BE A MINIMUM OF -0.01 IN. WC (-2.5 Pa). INITIAL SETPOINT: -0.025 IN. WC. (ADJ). COORDINATE TIGHT SEAL OF OPERATING ROOM ENVELOPE WITH ALL TRADES. EACH OPERATING ROOM SHALL MEET POSITIVE/STERILE ROOM CRITERIA ACROSS ALL BOUNDARIES: OPERATING ROOM TO CORRIDOR, OPERATING ROOM TO SURGICAL SUPPLIES ROOMS, AND OPERATING ROOM TO CLEAN CORE (OR-6 ONLY). THE AIRFLOW PRESSURIZATION CASCADE SHALL BE AS INDICATED ON DRAWING M7.00 AND SHALL BE VERIFIED AS "POSITIVE" FOR NORMAL OCCUPIED MODE/UNOCCUPIED MODES WITHOUT ALARMS (KEY-SWITCH ENGAGED TO DISABLE ALARMS). BAS SHALL MONITOR PRESSURE DIFFERENTIALS FOR ALL MODES. SURGICAL SUITE DIFFERENTIAL PRESSURES SHALL BE TESTED AND CONFIRMED AS NEUTRAL DURING SMOKE PURGE MODE.

B. A ROOM DIFFERENTIAL PRESSURE MONITOR (TSI OR APPROVED EQUAL), WITH KEYED OVERRIDE SWITCH, SHALL COONTINUOUSLY MONITOR/ALARM THE ROOM DIFFERENTIAL PRESSURE AT EACH OPERATING ROOM AS REFERENCED TO ITS ADJACENT SPACE(S). AN ADDITIONAL SUMMARY MONITORING & ALARM PANEL SHALL BE PROVIDED AT THE MAIN SURGICAL SUITE NURSE STATION (CONTROL, 3B-159) TO DISPLAY STATUS AND ALARMS FOR ALL SIX OPERATING ROOMS AND THEIR ASSOCIATED ADJACENCIES. ALL DIFFERENTIAL PRESSURE MONITORS AND KEYED OVERRIDE SWITCHES SHALL BE ON "EMERGENCY" POWER.

C. WHEN THE ROOM DIFFERENTIAL PRESSURE IS WITHIN ITS ACCEPTABLE PRESSURE ALARM PARAMETERS (MINIMUM DIFFERENTIAL OF 0.01 IN. WC./2.5 Pa, ADJUSTABLE), AS SET AT THE ROOM DIFFERENTIAL PRESSURE MONITOR/ALARM, THE GREEN "NORMAL" LIGHT SHALL BE ILLUMINATED. WHEN THE ROOM DIFFERENTIAL PRESSURE IS NOT WITHIN ITS ACCEPTABLE PRESSURE ALARM PARAMETERS, THE RED "ALARM" LIGHT SHALL BE ILLUMINATED AND THE ROOM DIFFERENTIAL PRESSURE MONITOR/ALARM SHALL PRODUCE A LOCAL AUDIBLE ALARM. AN ALARM SHALL ALSO BE GENERATED AT THE BAS WORKSTATION(S).

D. ROOM PRESSURE SENSORS SHALL BE PROVIDED BETWEEN OPERATING ROOM AND ADJACENT CORRIDOR AND THE OPERATING ROOM AND THE ADJACENT SUPPLIES/CLEAN CORE ROOMS.

E. EACH ROOM SHALL HAVE ITS OWN MONITOR MOUNTED AS INDICATED ON PLANS. MONITOR SHALL HAVE A LCD DISPLAY WITH KEYPAD, ROOM ALARM STATUS INDICATOR, VISUAL AND AUDIBLE ALARM ANNUNCIATOR, ALARM RELAY OUTPUT, ANALOG PRESSURE OUTPUT (MA OR VDC TO BE MONITORED BY BAS), SERIAL ASYNCHRONOUS COMMUNICATIONS PORT UTILIZING ASCII OR BACNET MS/TP PROTOCOL, ALARM SILENCE VIA KEYPAD, TEST VIA KEYPAD, AND ISOLATED POWER SUPPLY. SUMMARY PANEL AT NURSE STATION/CONTROL 3B-159 SHALL BE SIMILAR IN APPEARANCE AND FUNCTION TO INDIVIDUAL SPACE MONITORS, BUT PROVIDE OVERALL SUMMARY SCREEN INDICATING FULL STATUS OF THE SIX OPERATING ROOMS/ASSOCIATED KEY SWITCHES AT ONE GLANCE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

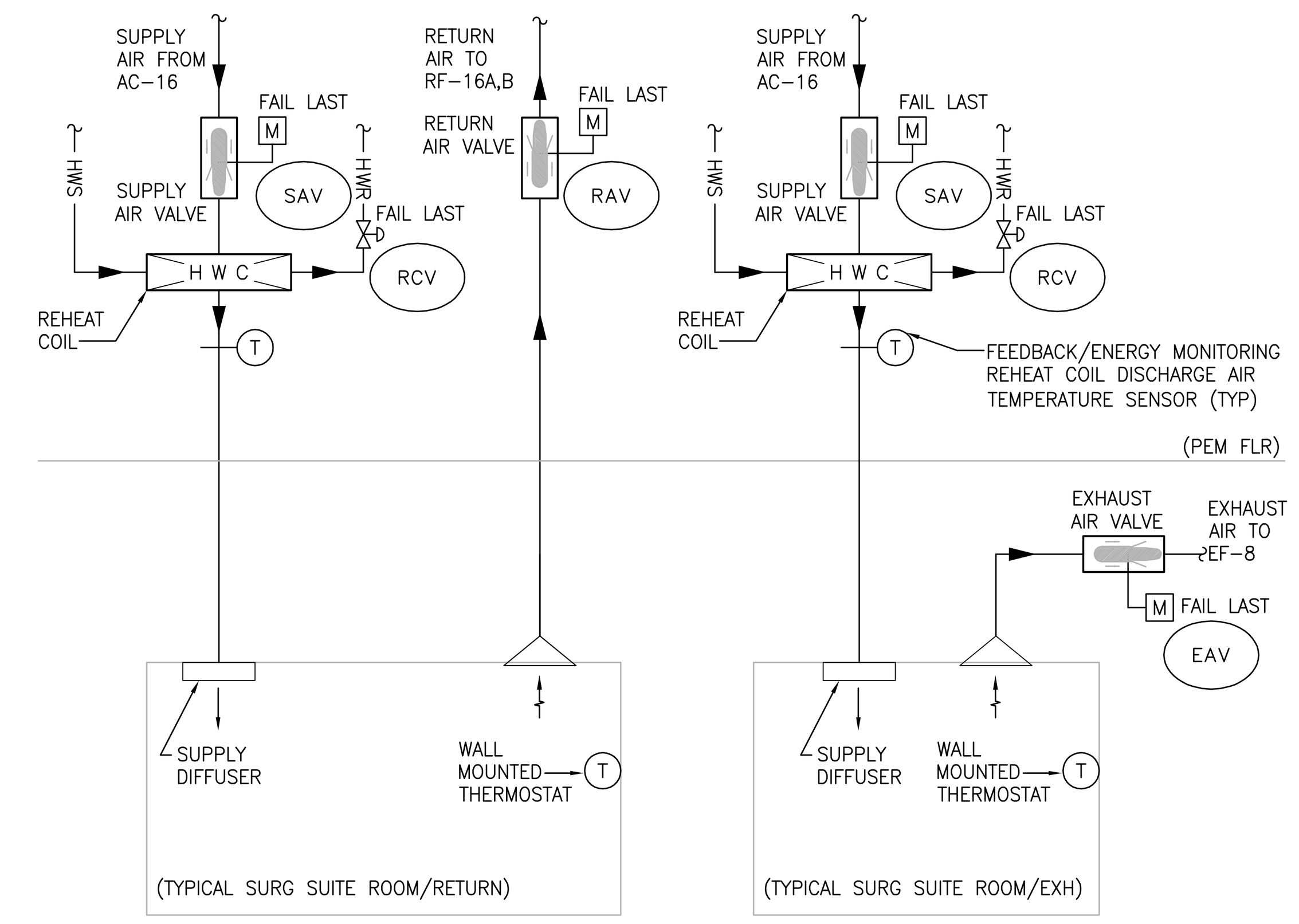
F. SENSORS AND MONITORS SHALL HAVE DEMONSTRATED SUCCESSFUL OPERATION FOR A MINIMUM OF 3 YEARS IN OPERATING ROOM/SURGICAL SUITE MONITORING APPLICATIONS.

G. EACH MONITOR SHALL HAVE A KEYED OVERRIDE SWITCH THAT ALLOWS THE MONITOR TO BE TAKEN OUT OF SERVICE FOR SPECIFIC/USER-DEFINED PERIODS WHEN SPACES ARE NOT IN USE FOR SURGICAL/STERILE OPERATIONS (CLEANING/MAINTENANCE/AFTER-HOURS, ETC.). WHEN THE KEYED OVERRIDE SWITCH IS PLACED IN THE "NEUTRAL" POSITION THE ROOM MONITOR DISPLAY INDICATOR SHALL CHANGE FROM "POSITIVE" TO "NEUTRAL". WHEN THE KEYED OVERRIDE SWITCH IS PLACED IN THE "POSITIVE" POSITION ROOM MONITOR DISPLAY SHALL CHANGE FROM "NEUTRAL" TO "POSITIVE". NO HVAC AIRFLOW CHANGES SHALL OCCUR, JUST DISABLING OF LOCAL AND REMOTE/BAS ALARMS BASED UPON VAMC PROTOCOL/AUTHORIZED PERSONNEL USAGE OF KEY SWITCH.

H. ROOM PRESSURE SENSORS AND MONITORS SHALL BE PROVIDED AS A PACKAGE FROM A SINGLE MANUFACTURER.

1 POSITIVE PRESSURE OPERATING ROOMS - PRESSURE-MONITORED ZONES

NTS



A. THE SUPPLY, RETURN AND/OR EXHAUST AIR FLOW CONTROL VALVES (ACCUVALVES) SHALL BE PRESSURE INDEPENDENT AND SHALL MAINTAIN CONSTANT AIR FLOW BASED UPON THE ENGAGED OPERATIONAL SEQUENCE FOR THE THIRD FLOOR NEW SURGICAL SUITE (OCC/UNOCC/SMOKE PURGE/WARM-UP MODES). A DIFFERENTIAL BETWEEN THE SUPPLY AND RETURN OR SUPPLY AND EXHAUST (AS NOTED ON DWG M7.00) SHALL BE MAINTAINED TO INSURE PRESSURIZATION IN THE SPACES AT ALL TIMES. SPACES SHALL BE NEUTRAL TO ADJACENCIES DURING SMOKE PURGE. SEE AIRFLOW CONTROL VALVE SCHEDULE FOR MORE INFO.

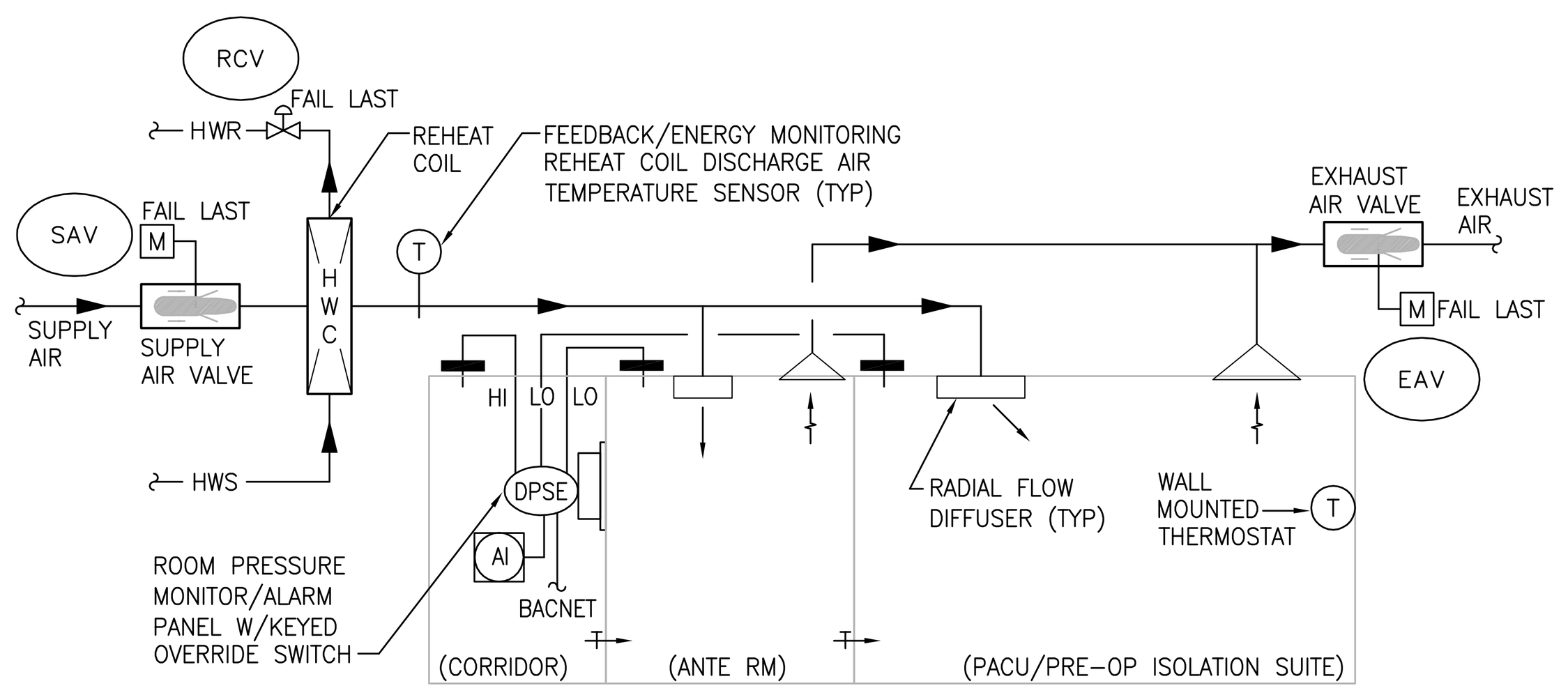
B. AIR QUANTITIES FOR ALL VALVES SHALL BE FULLY ADJUSTABLE WITHIN THE BAS. SUPPLY, RETURN AND EXHAUST AIRFLOW AND ROOM TEMPERATURE SHALL BE MEASURED, MONITORED AND ALARMED WITHIN THE BAS FOR EACH SPACE.

C. NORMAL OCCUPIED AND UNOCCUPIED MODES MAINTAIN THE TYPICAL ROOMS AT AIRFLOW OFFSETS AND RELATIVE PRESSURES AS PER DWG. M7.00. TYPICAL SURGICAL SUITE ROOMS DO NOT INCLUDE ROOM PRESSURE MONITORING, HOWEVER, BAS CONTRACTOR SHALL ASSIST TAB CONTRACTOR IN THE VERIFICATION AND DOCUMENTATION OF EACH OPERATING MODE AND THAT TYPICAL ROOMS MAINTAIN DESIGN INTENT AIRFLOW OFFSETS AS SCHEDULED AND AS INDICATED ON DRAWING M7.00.

D. THE ROOM TEMPERATURE SENSORS SHALL PROVIDE REHEAT COIL CONTROL AS DESCRIBED IN AIRFLOW CONTROL VALVE SEQUENCES.

2 TYPICAL SURGICAL SUITE ROOMS (NON-OR'S)

NTS



A. THE SUPPLY AND EXHAUST AIRFLOW CONTROL VALVES (ACCUVALVES) SHALL BE PRESSURE INDEPENDENT AND SHALL MAINTAIN CONSTANT AIR FLOW AT ALL TIMES NO MATTER WHAT THE ENGAGED OPERATIONAL SEQUENCE FOR THE THIRD FLOOR SURGICAL PACU/PRE-OP SUITES. A DIFFERENTIAL BETWEEN THE SUPPLY AND EXHAUST (AS NOTED ON DWG M7.00) SHALL BE MAINTAINED TO INSURE PRESSURIZATION IN THE SPACES AT ALL TIMES.

B. AIR QUANTITIES FOR BOTH VALVES SHALL BE FULLY ADJUSTABLE WITHIN THE BAS. SUPPLY AND EXHAUST AIRFLOW, ROOM TEMPERATURE AND ROOM PRESSURE SHALL BE MEASURED, MONITORED AND ALARMED WITHIN THE BAS FOR EACH SPACE.

C. NEGATIVE PRESSURE/ISOLATION PATIENT ROOMS SHALL INCLUDE ACTIVE ROOM PRESSURE MONITORING WITH LOCAL AND BAS MEASUREMENT, MONITORING AND ALARM. LOCAL ROOM PRESSURE MONITOR PANELS (TSI OR APPROVED EQUAL-SEE PLANS FOR LOCATIONS) SHALL INCLUDE KEY SWITCH TO ALLOW LOCAL AND REMOTE/BAS ALARMS TO BE DISABLED WHEN SPACES ARE NOT REQUIRED FOR ISOLATION. BAS OPERATING MODE IS NOT CHANGED AS SPACES CONTINUE TO MAINTAIN CONSTANT VOLUME. BAS CONTINUES TO MONITOR PRESSURE, ONLY THE ALARMS ARE DISENGAGED TO ALLOW FOR ROOM CLEANING, DOOR OPENING, ETC. BASED ON VAMC STANDARD OPERATING PROCEDURES/QUALIFIED PERSONNEL USE OF THE KEY/KEY SWITCHES. BAS CONTRACTOR SHALL ASSIST IN THE VERIFICATION AND DOCUMENTATION OF ALL OPERATION MODES AND THAT NEGATIVE PRESSURE/ISOLATION PATIENT ROOMS MAINTAIN NEGATIVE AIRFLOW OFFSETS AS SCHEDULED AND AS INDICATED ON DRAWING M7.00.

D. THE PATIENT ROOM TEMPERATURE SENSORS SHALL PROVIDE REHEAT COIL CONTROL AS DESCRIBED IN AIRFLOW CONTROL VALVE SEQUENCES.

DIFFERENTIAL PRESSURE MONITOR/ALARM SEQUENCE OF OPERATION (ISOLATION PATIENT ROOMS)

1. GENERAL

A. DIFFERENTIAL PRESSURE BETWEEN NEGATIVE PRESSURE ISOLATION PATIENT ROOMS AND ADJACENT PRE-OP/PACU CORRIDOR SHALL BE A MINIMUM OF -0.01 IN. WC (-2.5 Pa). INITIAL SETPOINT: -0.025 IN. WC. (ADJ). COORDINATE TIGHT SEAL OF ISOLATION ROOM ENVELOPE WITH ALL TRADES. EACH PATIENT ROOM SHALL MEET ISOLATION ROOM CRITERIA ACROSS ALL BOUNDARIES: CORRIDOR TO ANTE ROOM, ANTE ROOM TO PATIENT ROOM, AND CORRIDOR TO PATIENT ROOM. THE AIRFLOW PRESSURIZATION CASCADE SHALL BE AS INDICATED ON DRAWING M7.00 AND SHALL BE VERIFIED AS "NEGATIVE" FOR NORMAL OCCUPIED MODE/UNOCCUPIED MODES WITHOUT ALARMS (KEY-SWITCH ENGAGED TO DISABLE ALARMS). BAS SHALL MONITOR PRESSURE DIFFERENTIALS AT ALL TIMES.

B. A ROOM DIFFERENTIAL PRESSURE MONITOR (TSI OR APPROVED EQUAL), WITH KEYED OVERRIDE SWITCH, SHALL CONTINUOUSLY MONITOR/ALARM THE ROOM DIFFERENTIAL PRESSURE AS REFERENCED TO ITS ADJACENT SPACES. THE ROOM DIFFERENTIAL PRESSURE MONITOR AND KEYED OVERRIDE SWITCH SHALL BE ON "EMERGENCY" POWER.

C. WHEN THE ROOM DIFFERENTIAL PRESSURE IS WITHIN ITS ACCEPTABLE PRESSURE ALARM PARAMETERS (MINIMUM DIFFERENTIAL OF 0.01 IN. WC./2.5 Pa, ADJUSTABLE), AS SET AT THE ROOM DIFFERENTIAL PRESSURE MONITOR/ALARM, THE GREEN "NORMAL" LIGHT SHALL BE ILLUMINATED. WHEN THE ROOM DIFFERENTIAL PRESSURE IS NOT WITHIN ITS ACCEPTABLE PRESSURE ALARM PARAMETERS, THE RED "ALARM" LIGHT SHALL BE ILLUMINATED AND THE ROOM DIFFERENTIAL PRESSURE MONITOR/ALARM SHALL PRODUCE A LOCAL AUDIBLE ALARM. AN ALARM SHALL ALSO BE GENERATED AT THE BAS WORKSTATION(S).

D. ROOM PRESSURE SENSORS SHALL BE PROVIDED BETWEEN ISOLATION ROOM AND ADJACENT CORRIDOR AND THE ANTE ROOM AND THE ADJACENT CORRIDOR.

E. EACH ROOM SHALL HAVE ITS OWN MONITOR MOUNTED AS INDICATED ON PLANS. MONITOR SHALL HAVE A LCD DISPLAY WITH KEYPAD, ROOM ALARM STATUS INDICATOR, VISUAL AND AUDIBLE ALARM ANNUNCIATOR, ALARM RELAY OUTPUT, ANALOG PRESSURE OUTPUT (MA OR VDC TO BE MONITORED BY BAS), SERIAL ASYNCHRONOUS COMMUNICATIONS PORT UTILIZING ASCII OR BACNET MS/TP PROTOCOL, ALARM SILENCE VIA KEYPAD, TEST VIA KEYPAD, AND ISOLATED POWER SUPPLY. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

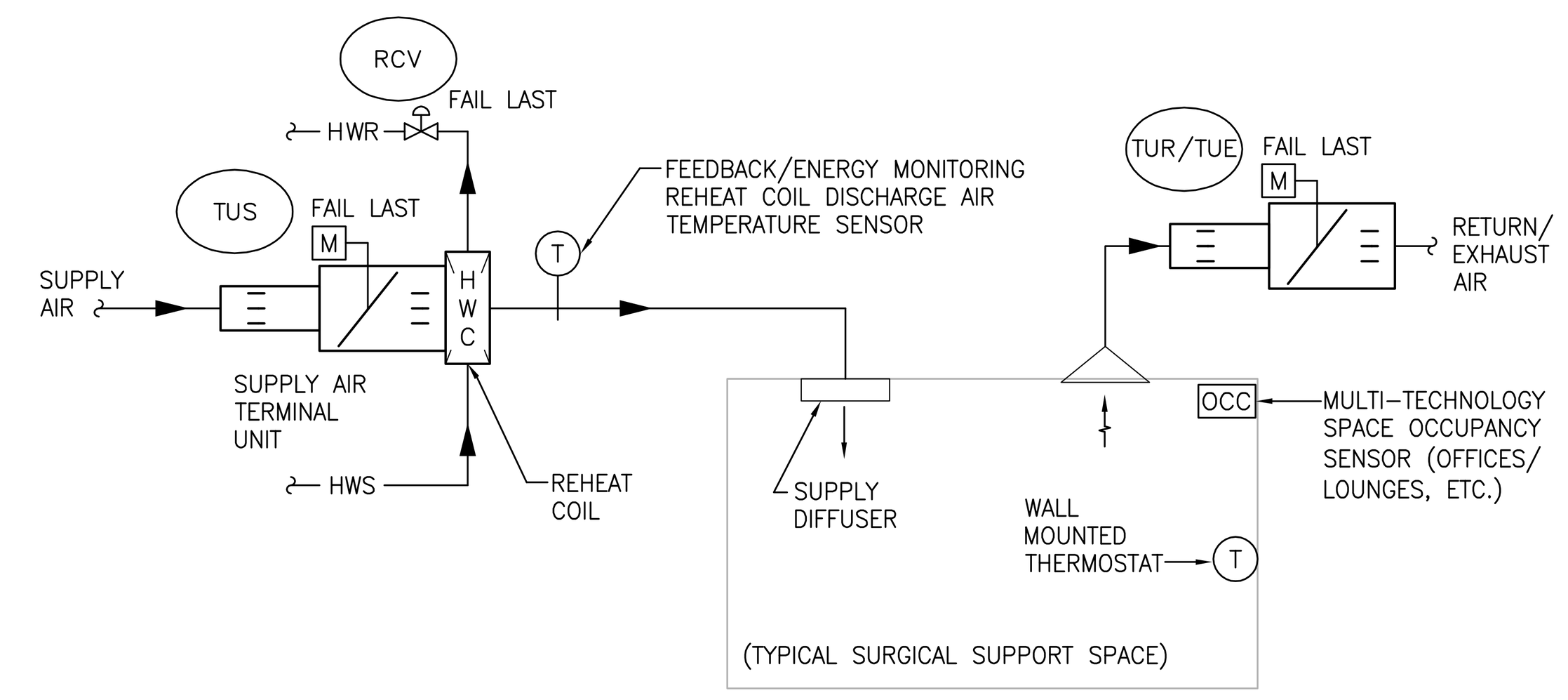
F. SENSORS AND MONITOR SHALL HAVE DEMONSTRATED SUCCESSFUL OPERATION FOR A MINIMUM OF 3 YEARS IN ISOLATION ROOM MONITORING APPLICATIONS.

G. EACH MONITOR SHALL HAVE A KEYED OVERRIDE SWITCH THAT ALLOWS THE MONITOR TO BE TAKEN OUT OF SERVICE WHEN SPACES ARE NOT IN USE FOR ISOLATION. WHEN THE KEYED OVERRIDE SWITCH IS PLACED IN THE "NEUTRAL" POSITION THE ROOM MONITOR DISPLAY INDICATOR SHALL CHANGE FROM "NEGATIVE" TO "NEUTRAL". WHEN THE KEYED OVERRIDE SWITCH IS PLACED IN THE "NEGATIVE" POSITION ROOM MONITOR DISPLAY SHALL CHANGE FROM "NEUTRAL" TO "NEGATIVE". NO HVAC AIRFLOW CHANGES SHALL OCCUR, JUST DISABLING OF LOCAL AND REMOTE/BAS ALARMS BASED UPON VAMC PROTOCOL/AUTHORIZED PERSONNEL USAGE OF KEY SWITCH.

H. ROOM PRESSURE SENSOR AND MONITOR SHALL BE PROVIDED AS A PACKAGE FROM A SINGLE MANUFACTURER.

3 NEGATIVE PRESSURE (AIRBORNE INFECTION) PATIENT ISOLATION ROOMS - PRESSURE-MONITORED ZONES

NTS



A. THE SUPPLY, RETURN AND/OR EXHAUST AIR TERMINAL UNITS (TUS, TUR, TUE) SHALL BE PRESSURE INDEPENDENT AND SHALL MODULATE TO MAINTAIN OCCUPIED OR UNOCCUPIED MODE AIR FLOW AT ALL TIMES DEPENDING UPON THE ENGAGED OPERATIONAL SEQUENCE FOR THE BLDG 1 SOUTH THIRD FLOOR SURGERY FACILITY SUPPORT AREAS (PACU/PRE-UP/OFFICE/ADMIN). DIFFERENTIALS BETWEEN THE SUPPLY, RETURN AND/OR EXHAUST (AS NOTED ON DWGS.) SHALL BE MAINTAINED TO INSURE PRESSURIZATION IN THE SPACES/OVERALL SURGICAL FACILITY AS REQUIRED.

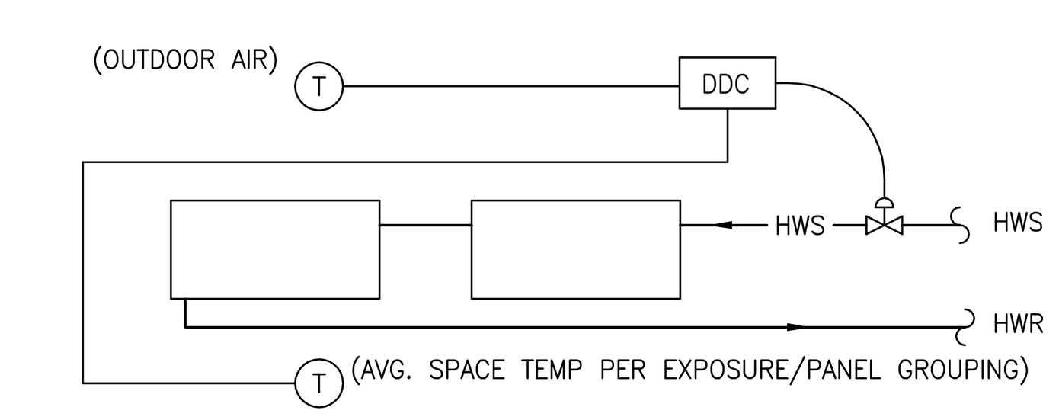
B. AIR QUANTITIES FOR ALL AIR TERMINAL UNITS SHALL BE FULLY ADJUSTABLE WITHIN THE BAS. SUPPLY, RETURN, EXHAUST AIRFLOW, ROOM TEMPERATURE AND ROOM OCCUPANCY (WHERE INDICATED ON PLANS) SHALL BE MEASURED, MONITORED AND ALARMED WITHIN THE BAS FOR EACH SPACE. TOTAL AHU SUPPLY, RETURN/RELIEF/EXHAUST AIR AND TOTAL OUTDOOR AIR SHALL ALL BE TRACKED AND TRENDED TO MAINTAIN THE PROPER SPACE BY SPACE OFFSETS AS WELL AS THE TOTAL BUILDING PRESSURIZATION OFFSET CFM AS MEASURED AND SET WITHIN BAS THE THROUGH COORDINATION WITH TAB CONTRACTOR. DESIGN INTENT IS FOR SURGICAL SUPPORT AREAS TO OPERATE SLIGHTLY POSITIVE WITH RESPECT TO EXTERIOR/OUTDOOR REFERENCE PRESSURE.

C. NORMAL OCCUPIED AND UNOCCUPIED MODES MAINTAIN THE TYPICAL SURGICAL SUPPORT ROOMS AT AIRFLOW OFFSETS AND RELATIVE PRESSURES AS PER DWG. M7.00. TYPICAL SURGICAL SUPPORT ROOMS DO NOT INCLUDE ROOM PRESSURE MONITORING, HOWEVER, BAS CONTRACTOR SHALL ASSIST TAB CONTRACTOR IN THE VERIFICATION AND DOCUMENTATION OF EACH OPERATING MODE AND THAT TYPICAL ROOMS MAINTAIN DESIGN INTENT AIRFLOW OFFSETS AS SCHEDULED AND AS INDICATED ON DRAWING M7.00.

D. SURGICAL SUPPORT AREA TEMPERATURE SENSORS SHALL PROVIDE REHEAT COIL CONTROL AS DESCRIBED IN AIRFLOW CONTROL VALVE SEQUENCES AS WELL AS FEEDBACK/ALARM OF SPACES THAT INCLUDE PERIMETER HEATING RADIANT CEILING PANELS.

4 TYPICAL SURGICAL SUPPORT AREAS (PACU/PRE-OP/ADMIN)

NTS



A. GENERAL: CONTROL VALVE FOR PERIMETER PACU/CONSULT ROOM RADIANT CEILING PANELS SHALL BE STROKED FULLY OPEN WHENEVER OUTDOOR AIR TEMPERATURE IS BELOW 60 DEG F (ADJ.). CLOSE VALVE UPON OA REACHING 65 DEG F (ADJ).

B. FAILURE MODE/FEEDBACK CONTROL: DESIGN INTENT IS FOR RADIANT CEILING PANEL HOT WATER CONTROL VALVES TO FAIL LAST POSITION. INDIVIDUAL CEILING HEATING ELEMENTS WILL NOT BE CONTROLLED. CEILING RADIANT PANELS TO ACT AS CONSTANT HEATING BASED ON OA AS PER ABOVE. ROOM REHEAT TO OPERATE AS DESCRIBED BY ROOM SEQUENCE. AS A FEEDBACK CONTROL/SAFETY, BAS SHALL MONITOR INDIVIDUAL SPACE TEMPERATURE SENSORS ASSOCIATED WITH EACH GROUPING OF RADIANT CEILING PANELS. BAS SHALL CLOSE THE RADIANT CEILING PANEL CONTROL VALVE IF AVERAGE SPACE TEMPERATURE MEASURED RISES 2 DEG F (ADJ) ABOVE SPACE TEMP. SET POINT. CONTROL VALVE SHALL BE RE-OPENED AFTER A 30 MINUTE PERIOD (ADJ) SHOULD OA TEMPERATURE MEET CRITERIA ABOVE AND AVERAGE SPACE TEMPERATURE FALLS 2 DEG F (ADJ) BELOW SPACE TEMP.

5 PERIMETER CEILING RADIATION

NTS

A. GENERAL

1. PROVIDE GENERAL MONITORING FOR SEQUENCES OF OPERATION AND/OR FAULT STATUS AND ALARM FOR THE FOLLOWING:

- OUTDOOR AIR REFERENCE TEMPERATURE AND HUMIDITY
- OUTDOOR REFERENCE PRESSURE (FOR PRESSURE OFFSETS/CASCADE INDICATED ON DRAWING M7.00).
- TEMPORARY GAS STORAGE ROOM EXHAUST FAN, 1S-EF-11, GENERAL FAULT STATUS.
- EXISTING ISOLATION ROOM EXHAUST FAN, 1S-EF-16, GENERAL FAULT STATUS.
- ATS/EMERGENCY GEN STATUS FOR EMERG POWER STATUS.
- FAULT/STATUS FOR THE EXISTING BUILDING 1S HEATING HOT WATER SYSTEM (DISTRIB. PUMP FAILURE/HWS TEMPERATURE).
- FAULT/STATUS FOR THE EXISTING CHILLED WATER SYSTEM (DISTRIBUTION PUMP FAILURE/CHWS TEMPERATURE).
- FAULT-ON-OFF STATUS OF 1S-AC-16 ROOFTOP CHILLED WATER PIPING ELECTRIC HEAT TRACE.
- FAULT-ON-OFF STATUS OF PEM UTILITY RISER PIPING (MAKE-UP WATER, FLOOR DRAINS, CHILLED WATER) ELECTRIC HEAT TRACE - PIPING THROUGH RAISED EQUIPMENT CURB.
- FSD - SD DAMPER END SWITCHES (OPEN/CLOSED STATUS)
- FSD - SD SMOKE DETECTOR STATUS

NOTE: SEE POINTS LISTS ON CONTROLS DRAWINGS, PLANS, AIRFLOW DIAGRAMS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS. PROVIDE ANY ADDITIONAL POINTS REQUIRED FOR SEQUENCES OF OPERATION.

6 MISC. MONITORING POINTS

NTS

100% CONSTRUCTION DOCUMENTS

FULLY SPRINKLERED

NO.	DESCRIPTION	DATE

CONSULTANTS:

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL THOMAS L. CHAPMAN ENGINEER NO. PE044043R

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Drawing Title: MECHANICAL CONTROLS

Approved: Medical Center Director

Project Title: RENOVATE SURGICAL SERVICE & UPGRADE OPERATING ROOMS

Location: HUNTINGTON, WV

Date: 10.31.2014 | Checked: MPP | Drawn: JLR

Project Number: 581-13-101

Building Number: 1S

Drawing Number: M8.04

Dwg. 091 of 178

Office of Construction and Facilities Management

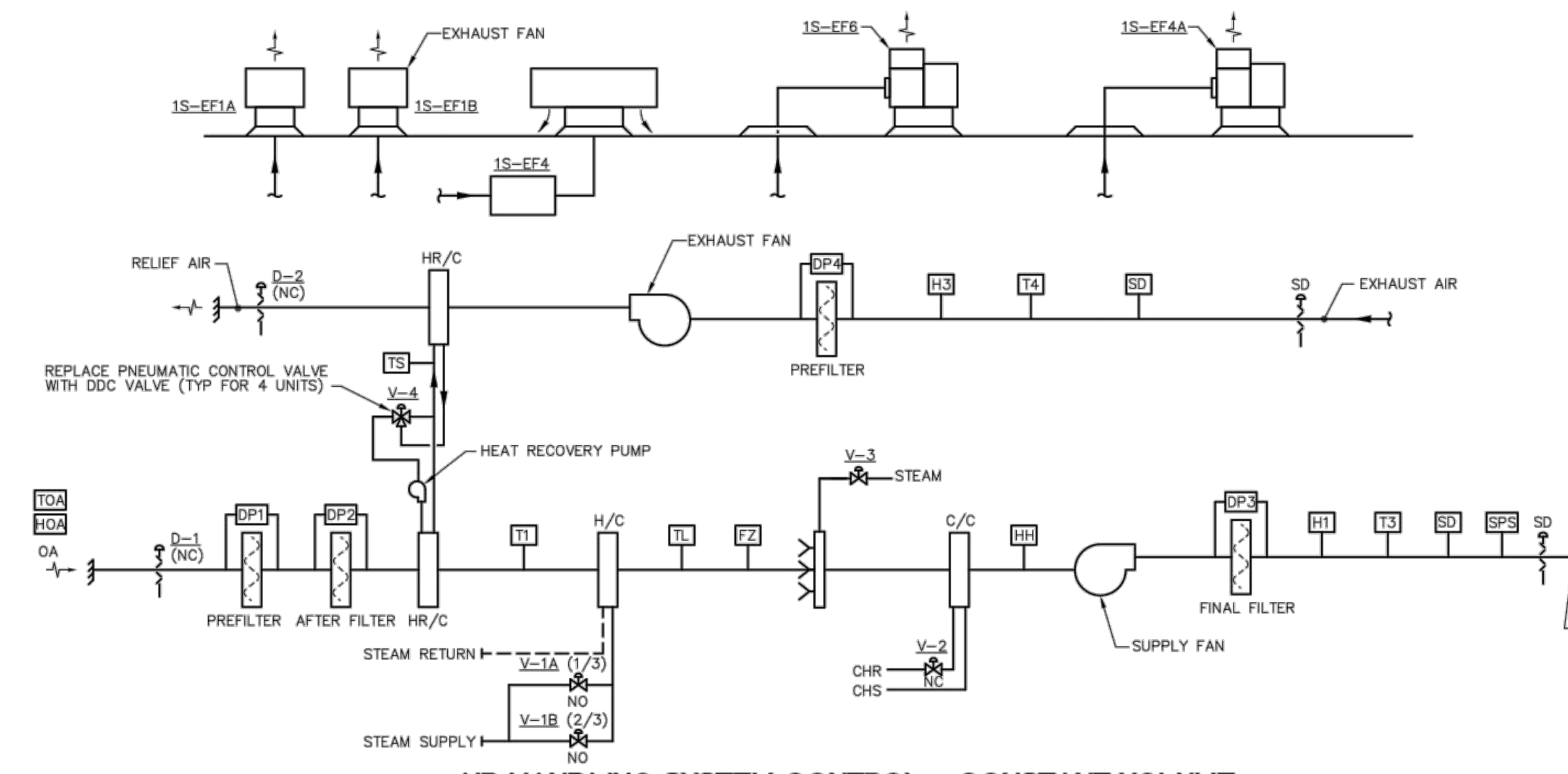
Department of Veterans Affairs

VA FORM 08-6231

INPUT / OUTPUT SCHEDULE

		INPUTS: ANALOG: MEASURED				INPUTS: ANALOG: CALCULATED				INPUTS: BINARY								OUTPUTS: DIGITAL				OUTPUTS: ANALOG					SYSTEM FEATURES: ALARMS						SYSTEM FEATURES: APPLICATION PROGRAMS												GENERAL
QUANTITY OF UNIT SYSTEM (ONE UON)	I/O LEGEND X – REQUIRED POINT	TEMPERATURE	PRESSURE	RH	AIR FLOW	KWH	ENTHALPY	RUN TIME	STATUS	FILTER	SMOKE	FREEZE	AIR FLOW	METER	DP SWITCH	CURRENT SWITCH	END SWITCH	OFF ON	OFF AUTO ON	OFF HIGH LOW	OPEN CLOSE	DAMPER POSITION	VALVE POSITION	SET POINT ADJ.	AOP	AOE	HIGH ANALOG	LOW ANALOG	HIGH BINARY	LOW BINARY	PROOF	SMOKE	TIME SCHEDULING	DEMAND LIMITING	PREVENTIVE MAINTENANCE	DUTY CYCLE	START STOP OPT.	ENTHALPY ECON.	SMOKE OPT.	TREND	ALARM INSTRUMENT	DDC	MANUAL OVERRIDE	DRYBULB ECON.	COLOR GRAPHICS
	AIR HANDLING UNIT (1S-AC1 & 1S-EF1)																																			X					X			X
	(SIMILAR FOR 1S-AC4, AC8, AC10)																																												
	SUPPLY FAN								X							X										X					X												X		
	EXHAUST FAN								X							X										X					X												X		
	OUTDOOR AIR DAMPER D-1								X								X																												
	EXHAUST DAMPER D-2								X								X																												
2	SMOKE DAMPER								X								X														X														
2	SMOKE DETECTOR										X																					X													
	PREFILTER DP1														X														X						X										
	AFTER FILTER DP2														X														X						X										
	FINAL FILTER DP3														X														X						X										
	PREFILTER (EXHAUST) DP4														X														X						X										
	OUTDOOR AIR TEMPERATURE TOA	X																																											
	OUTDOOR AIR HUMIDITY HOA			X																																									
	HEAT RECOVERY TEMPERATURE T1	X																																											
	LOW LIMIT TEMPERATURE T2	X																										X																	
	FREEZESTAT F2																													X															
	SUPPLY DISCHARGE TEMPERATURE T3	X																											X	X															
	EXHAUST AIR TEMPERATURE T4	X																																											
	SUPPLY DISCHARGE HUMIDITY H1			X																																									
	SPACE HUMIDITY H2			X																																									
	EXHAUST AIR HUMIDITY H3			X																																									
	LOW TEMPERATURE TL	X																												X															
	HIGH HUMIDITY HH			X																							X																		
	STATIC PRESSURE SENSOR SPS																										X																		
	PREHEAT COIL VALVE (1/3 CAPACITY) V-1A																									X																			
	PREHEAT COIL VALVE (2/3 CAPACITY) V-1B																									X																			
	COOLING COIL VALVE V-2																									X																			
	HUMIDIFIER VALVE V-3																									X																			
	HEAT RECOVERY VALVE V-4																									X																			
	HEAT RECOVERY WATER TEMP T5	X																																											
	HEAT RECOVERY PUMP								X							X															X														
	EXHAUST FAN 1S-EF1A								X							X										X					X												X		
	EXHAUST FAN 1S-EF1B								X							X										X					X												X		
	EXHAUST FAN 1S-EF4 (1S-AC4)								X							X										X					X												X		
	EXHAUST FAN 1S-EF4A (1S-AC4)								X							X										X					X												X		
	EXHAUST FAN 1S-EF6 (1S-AC4)								X							X										X					X												X		

REFERENCE DRAWING MH701 - VAMC PROJECT # R581-08-113 - REPLACE AHU'S



AIR HANDLING SYSTEM CONTROL - CONSTANT VOLUME WITH ENERGY RECOVERY (1S-AC1 AND 1S-EF1)

(SIMILAR FOR 1S-AC4, 1S-AC8, AND 1S-AC10)

SEQUENCE OF OPERATION

1. GENERAL

1.1 SUPPLY AIR FAN AND EXHAUST AIR FAN OPERATION SHALL BE INTERLOCKED. SUPPLY AND EXHAUST FANS SHALL OPERATE CONTINUOUSLY IN THE OCCUPIED MODE. H-O-A SWITCH SHALL BE KEPT IN "AUTO" POSITION. IN "OFF" POSITION, D-1 AND D-2 SHALL BE FULLY CLOSED. WHEN FANS ARE DE-ENERGIZED, D-1 AND D-2 SHALL BE FULLY CLOSED.

1.2 FANS SHALL BE NORMALLY STARTED AND STOPPED OR OCCUPIED-UNOCCUPIED MODE SHALL BE AS DETERMINED BY THE ENERGY CONTROL CENTER (ECC).

1.3 PROVIDE SEPARATE, INDEPENDENT LINKAGE CONTROL FOR D-1 AND D-2.

2. TEMPERATURE CONTROL

2.1 OCCUPIED:

A. THE SUPPLY AIR TEMPERATURE, SENSED BY T3, SHALL THEN BE MAINTAINED AT SETPOINT BY MODULATING V-1A, V-1B OR V-2 AS REQUIRED. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE AS PER THE FOLLOWING SUPPLY AIR RESET SCHEDULE (ALL TEMPERATURES SHALL BE ADJUSTABLE).

1. ON A CALL FOR PREHEAT, THE ⅓ CAPACITY AND ⅔ CAPACITY PREHEAT VALVE WILL OPEN IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. WHEN THE UNIT IS SHUTDOWN, THE PREHEAT COIL WILL BE COMMANDED TO A PRESET POSITION SHOULD THE OUTSIDE AIR TEMPERATURE FALL BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT. UPON A LOSS OF AIRFLOW, THE PREHEAT COIL WILL BE COMMANDED TO A PRESET POSITION SHOULD THE OUTDOOR AIR TEMPERATURE FALL BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT.

SUPPLY AIR RESET SCHEDULE	
OA TEMP (°F)	SUPPLY AIR TEMP (°F)
55 OR BELOW	55
56 – 60	55
61 – 70	55
71 – 80	55
81 OR ABOVE	55

2.2 UNOCCUPIED (HEATING): NIGHT THERMOSTAT SHALL CYCLE FANS AND OPEN HEATING VALVE, V-1, TO MAINTAIN NIGHT SETBACK TEMPERATURE. D-1 AND D-2 SHALL BE OPEN. WHEN SUPPLY FAN CYCLES 'ON' THE ASSOCIATED VAV TERMINAL DAMPERS SHALL OPEN. BELOW 35 °F OUTSIDE AIR TEMPERATURE, HEATING VALVE SHALL MODULATE TO MAINTAIN INTERIOR UNIT TEMPERATURE OF 90°F (ADJUSTABLE).

2.3 UNOCCUPIED (COOLING): NIGHT THERMOSTAT AND HUMIDISTAT SHALL CYCLE FAN(S) AND OPEN COOLING VALVE, V-2. TO MAINTAIN NIGHT SETBACK TEMPERATURE AND HUMIDITY SETPOINTS (ADJUSTABLE). D-1 AND D-2 SHALL BE OPEN.

2.4 MORNING WARM-UP: WHEN SYSTEM IS FIRST INDEXED TO OCCUPIED, DAMPERS D-1 & D-2 SHALL OPEN, VAV TERMINAL DAMPERS SHALL OPEN, AND FANS SHALL OPERATE WITH HEATING VALVE OPEN UNTIL RETURN AIR, AS SENSED BY T4, REACHES 65 °F (ADJUSTABLE).

3. HUMIDITY CONTROL

3.1 HUMIDISTAT, H3, SHALL MODULATE THE HUMIDIFIER CONTROL VALVE TO MAINTAIN THE HUMIDITY SETPOINT. HIGH LIMIT HUMIDISTAT, HH, SHALL OVERRIDE THIS CONTROL TO MAINTAIN A MAXIMUM HUMIDITY OF 85% (ADJUSTABLE). CONTROL VALVE, V-3, SHALL BE CLOSED WHENEVER SUPPLY FAN IS DE-ENERGIZED.

4. HEAT RECOVERY

4.1 THE GLYCOL HEAT RECOVERY LOOP WILL BE ENABLED WHEN THE ABSOLUTE VALUE OF THE DIFFERENCE BETWEEN THE EXHAUST AIR TEMPERATURE AND THE OUTDOOR AIR TEMPERATURE IS GREATER THAN THE HEAT RECOVERY SETPOINT. AFTER THE CIRCULATION PUMP HAS BEEN STARTED THE HEAT RECOVERY CONTROL VALVE WILL MODULATE IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. ON A DROP IN GLYCOL TEMPERATURE BELOW THE LOW LIMIT SETPOINT, THE HEAT RECOVERY LOOP WILL CHANGE MODES TO MAINTAIN A MINIMUM GLYCOL TEMPERATURE TO PREVENT FREEZING. UPON A LOSS OF GLYCOL LOOP PUMP STATUS, THE PUMP WILL AUTOMATICALLY RESTART.

5. FREEZE PROTECTION

5.1 WHEN THE AIR TEMPERATURE, AS SENSED BY T2, FALLS BELOW 40°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE ECC. IF THIS TEMPERATURE FALLS BELOW 36 °F, AS SENSED BY FZ THE UNIT SUPPLY AND RETURN FAN(S) SHALL DE-ENERGIZE, AND A CRITICAL ALARM SHALL BE INDICATED AT THE ECC, THE HEATING VALVE V-1 SHALL OPEN FULLY AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

6. MISCELLANEOUS

6.1 SMOKE DETECTORS, SD, LOCATED IN THE SUPPLY AND RETURN AIR SHALL DE-ENERGIZE FANS AND CLOSE ASSOCIATED SMOKE DAMPERS SHOULD PRODUCTS OF COMBUSTION BE SENSED. ALARM AT THE ECC.

6.2 HIGH LIMIT STATIC PRESSURE SENSOR, SPS-1 SHALL DE-ENERGIZE AHU FANS WHEN STATIC PRESSURE REACHES 6.0" (ADJUSTABLE). ALARM AT THE ECC.

6.3 THE ECC SHALL MONITOR FILTER LOADING ACROSS EACH FILTER BANK. ALARM AT THE ECC.

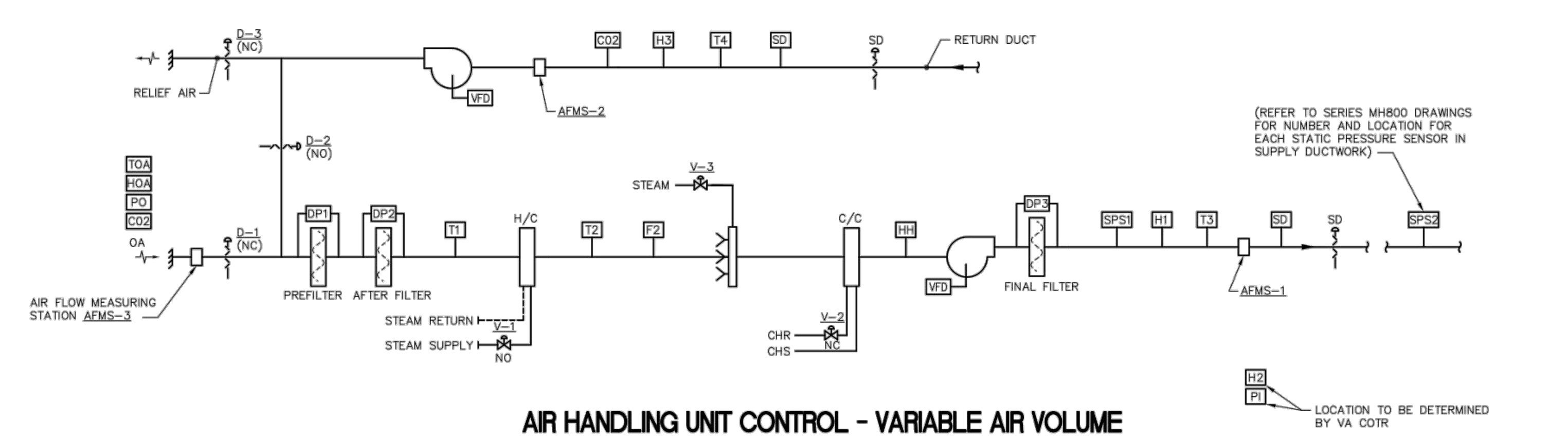
6.4 PROVIDE OUTDOOR AIR AND RETURN AIR CO2 SENSORS AND MONITOR AT THE ECC.

6.5 EXHAUST FANS SHALL BE INTERLOCKED WITH RESPECTIVE AIR HANDLING UNITS TO SHUT OFF DURING A SMOKE CONDITION AND WHEN THE AIR HANDLING UNIT SHUTS DOWN (VERIFY EXHAUST FAN OPERATION FOR CRITICAL SPACES WITH VA COTR).

INPUT / OUTPUT SCHEDULE

		INPUTS: ANALOG: MEASURED				INPUTS: ANALOG: CALCULATED				INPUTS: BINARY								OUTPUTS: DIGITAL				OUTPUTS: ANALOG					SYSTEM FEATURES: ALARMS						SYSTEM FEATURES: APPLICATION PROGRAMS												GENERAL
QUANTITY OF UNIT SYSTEM (ONE UON)	I/O LEGEND X – REQUIRED POINT	TEMPERATURE	PRESSURE	RH	AIR FLOW	KWH	ENTHALPY	RUN TIME	STATUS	FILTER	SMOKE	FREEZE	AIR FLOW	METER	DP SWITCH	CURRENT SWITCH	END SWITCH	OFF ON	OFF AUTO ON	OFF HIGH LOW	OPEN CLOSE	DAMPER POSITION	VALVE POSITION	SET POINT ADJ.	AOP	AOE	HIGH ANALOG	LOW ANALOG	HIGH BINARY	LOW BINARY	PROOF	SMOKE	TIME SCHEDULING	DEMAND LIMITING	PREVENTIVE MAINTENANCE	DUTY CYCLE	START STOP OPT.	ENTHALPY ECON.	SMOKE OPT.	TREND	ALARM INSTRUMENT	DDC	MANUAL OVERRIDE	DRYBULB ECON.	COLOR GRAPHICS
	AIR HANDLING UNIT (1S-AC1 & 1S-RF1)																																			X					X			X
	(SIMILAR FOR 1S-AC3, AC5, AC6, AC7, AC9																																												
	AC11, AC12 & AC13)																																												
	SUPPLY FAN W/VFD								X							X										X					X												X		
	RETURN FAN W/VFD								X							X										X					X												X		
	OUTDOOR AIR DAMPER D-1								X								X																												
	RETURN AIR DAMPER D-2								X								X																												
	RELIEF AIR DAMPER D-3								X								X																												
2	SMOKE DAMPER								X								X														X														
2	SMOKE DETECTOR										X																					X													
	PREFILTER DP1														X														X						X										
	AFTER FILTER DP2														X														X						X										
	FINAL FILTER DP3														X														X						X										
	OUTDOOR AIR TEMPERATURE TOA	X																																											
	OUTDOOR AIR HUMIDITY HOA			X																																									
2	CARBON DIOXIDE SENSOR CO2																																												
	MIXED AIR TEMPERATURE T1	X																																											
	LOW LIMIT TEMPERATURE T2	X																										X																	
	FREEZESTAT F2																													X															
	SUPPLY DISCHARGE TEMPERATURE T3	X																									X	X																	
	RETURN AIR TEMPERATURE T4	X																																											
	SUPPLY DISCHARGE HUMIDITY H1			X																																									
	SPACE HUMIDITY H2			X																																									
	RETURN AIR HUMIDITY H3			X																																									
	HIGH LIMIT HUMIDITY HH																										X																		
	STATIC PRESSURE SENSOR SPS-1		X																										X																
	STATIC PRESSURE SENSOR SPS-2		X																																										
3	AIR FLOW MEASURING STATION				X																																								
	SPACE PRESSURIZATION PO		X																																										
	SPACE PRESSURIZATION PI		X																																										
	PREHEAT COIL VALVE V-1																									X																			
	COOLING COIL VALVE V-2																									X																			
	HUMIDIFIER VALVE V-3																									X																			

REFERENCE DRAWING MH702 - VAMC PROJECT # R581-08-113 - REPLACE AHU'S



AIR HANDLING UNIT CONTROL - VARIABLE AIR VOLUME (1S-AC2 AND 1S-RF2)

(SIMILAR FOR 1S-AC3, 1S-AC5, 1S-AC6, 1S-AC7, 1S-AC9, 1S-AC11, 1S-AC12 AND 1S-AC13)

SEQUENCE OF OPERATION:

1. GENERAL

1.1 SUPPLY AIR FAN AND RETURN AIR FAN OPERATION SHALL BE INTERLOCKED. SUPPLY AND RETURN FANS SHALL OPERATE CONTINUOUSLY IN THE OCCUPIED MODE. H-O-A SWITCH SHALL BE KEPT IN "AUTO" POSITION. IN "OFF" POSITION, D-1 AND D-3 SHALL BE FULLY CLOSED AND D-2 SHALL BE FULLY OPEN. WHEN FANS ARE DE-ENERGIZED, D-1 AND D-3 SHALL BE FULLY CLOSED.

1.2 FANS SHALL BE NORMALLY STARTED AND STOPPED OR OCCUPIED-UNOCCUPIED MODE SHALL BE AS DETERMINED BY THE ENERGY CONTROL CENTER (ECC).

1.3 PROVIDE SEPARATE, INDEPENDENT LINKAGE CONTROL FOR EACH M.O.D. (D-1, D-2 & D-3).

2. TEMPERATURE CONTROL

2.1 OCCUPIED:

A. WHEN THE OUTSIDE AIR ENTHALPY IS ABOVE THE RETURN AIR ENTHALPY, D-1, D-2 & D-3 SHALL MODULATE AS FOLLOWS:

1) D-1 (OUTSIDE AIR) SHALL MODULATE TO MINIMUM OUTSIDE AIR POSITION.

2) D-2 (RETURN AIR) SHALL FULLY OPEN.

3) D-3 (RELIEF AIR) SHALL MODULATE TO MAINTAIN A POSITIVE BUILDING PRESSURIZATION OF 0.05 IN. WC. AS SENSED BY INDOOR AND OUTDOOR PRESSURE SENSORS (Pi VERSUS Po).

4) D-3 SHALL BE CLOSED WHENEVER BUILDING PRESSURIZATION (Pi VERSUS Po) IS LESS THAN 0.01" WC.

B. WHEN THE OUTSIDE AIR ENTHALPY IS LESS THEN THE RETURN AIR ENTHALPY, D-1, D-2 & D-3 SHALL MODULATE TO MAXIMIZE ATMOSPHERIC (FREE) COOLING AND MAINTAIN A MIXED AIR TEMPERATURE EQUAL TO THE SUPPLY AIR TEMPERATURE SETPOINT (ADJUSTABLE). THE RELIEF DAMPER SHALL MODULATE TO MAINTAIN A POSITIVE BUILDING PRESSURE OF 0.05" W.C. (ADJUSTABLE) AS SENSED BY INDOOR AND OUTDOOR PRESSURE SENSORS (Pi AND Po).

C. THE SUPPLY AIR TEMPERATURE, SENSED BY T3, SHALL THEN BE MAINTAINED AT SETPOINT BY MODULATING V-1 OR V-2 AS REQUIRED. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE AS PER THE FOLLOWING SUPPLY AIR RESET SCHEDULE (ALL TEMPERATURES SHALL BE ADJUSTABLE).

SUPPLY AIR RESET SCHEDULE	
OA TEMP (°F)	SUPPLY AIR TEMP (°F)
55 OR BELOW	55
56 – 60	55
61 – 70	55
71 – 80	55
81 OR ABOVE	55

TO BE DETERMINED IN FIELD BY VA COTR

2.2 UNOCCUPIED (HEATING): NIGHT THERMOSTAT SHALL CYCLE FANS AND OPEN HEATING VALVE, V-1, TO MAINTAIN NIGHT SETBACK TEMPERATURE. D-1 AND D-3 SHALL BE FULLY CLOSED AND D-2 FULLY OPEN. WHEN SUPPLY FAN CYCLES 'ON' THE ASSOCIATED VAV TERMINAL DAMPERS SHALL OPEN. BELOW 35 °F OUTSIDE AIR TEMPERATURE, HEATING VALVE SHALL MODULATE TO MAINTAIN INTERIOR UNIT TEMPERATURE OF 90°F (ADJUSTABLE).

2.3 UNOCCUPIED (COOLING): NIGHT THERMOSTAT AND HUMIDISTAT SHALL CYCLE FAN(S) AND OPEN COOLING VALVE, V-2. TO MAINTAIN NIGHT SETBACK TEMPERATURE AND HUMIDITY SETPOINTS (ADJUSTABLE). D-1 AND D-3 SHALL BE FULLY CLOSED AND D-2 FULLY OPEN.

2.4 MORNING WARM-UP: WHEN SYSTEM IS FIRST INDEXED TO OCCUPIED, DAMPERS D-1 & D-3 SHALL REMAIN CLOSED, D-2 SHALL REMAIN OPEN, VAV TERMINAL DAMPERS SHALL OPEN, AND FANS SHALL OPERATE WITH HEATING VALVE OPEN UNTIL RETURN AIR, AS SENSED BY T5, REACHES 65 °F (ADJUSTABLE).

3. AIR FLOW / FAN CONTROL

3.1 OCCUPIED:

A. STATIC PRESSURE SENSOR, SPS-2, SHALL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE, VFD TO MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SETPOINT. WHERE MULTIPLE SENSORS ARE INDICATED ON PLANS, THE PRESSURES SHALL BE AVERAGED.

B. AIR FLOW MONITOR, AFMS-3, LOCATED IN OUTDOOR AIR DUCT SHALL MODULATE D-1 TO MAINTAIN VENTILATION AIR QUANTITY AS INDICATED ON AIR HANDLING UNIT SCHEDULE. AFMS-3 CONTROL SHALL BE OVERRIDED DURING ECONOMIZER MODE.

C. THE ECC SHALL MODULATE THE RETURN FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN AN OFFSET BETWEEN THE SUPPLY AND RETURN FAN AS REQUIRED TO MAINTAIN AN AIR FLOW OFFSET EQUAL TO THE OUTSIDE AIR.

3.2 UNOCCUPIED: DURING NIGHT SETBACK AND MORNING WARM-UP OPERATION, FANS SHALL BE ENERGIZED AS PER 2.2 AND 2.3 ABOVE. RETURN FAN VARIABLE FREQUENCY DRIVE, VFD, SHALL MODULATE TO MAINTAIN FULL AIRFLOW (EQUAL TO SUPPLY AIRFLOW) DURING WARM-UP & NIGHT SETBACK OPERATION.

4. HUMIDITY CONTROL

4.1 HUMIDISTAT, H3, SHALL MODULATE THE HUMIDIFIER CONTROL VALVE TO MAINTAIN THE HUMIDITY SETPOINT. HIGH LIMIT HUMIDISTAT, HH, SHALL OVERRIDE THIS CONTROL TO MAINTAIN A MAXIMUM HUMIDITY OF 85% (ADJUSTABLE). CONTROL VALVE, V-3, SHALL BE CLOSED WHENEVER SUPPLY FAN IS DE-ENERGIZED.

5. FREEZE PROTECTION

5.1 WHEN THE AIR TEMPERATURE, AS SENSED BY T2, FALLS BELOW 40°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE ECC. IF THIS TEMPERATURE FALLS BELOW 36 °F, THE UNIT SUPPLY AND RETURN FAN(S) SHALL DE-ENERGIZE, AND A CRITICAL ALARM SHALL BE INDICATED AT THE ECC, THE HEATING VALVE V-1 SHALL OPEN FULLY AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

6. MISCELLANEOUS

6.1 SMOKE DETECTORS, SD, LOCATED IN THE SUPPLY AND RETURN AIR SHALL DE-ENERGIZE FANS AND CLOSE ASSOCIATED SMOKE DAMPERS SHOULD PRODUCTS OF COMBUSTION BE SENSED. ALARM AT THE ECC.

6.2 HIGH LIMIT STATIC PRESSURE SENSOR, SPS-1 SHALL DE-ENERGIZE AHU FANS WHEN STATIC PRESSURE REACHES 6.0" (ADJUSTABLE). ALARM AT THE ECC.

6.3 THE ECC SHALL MONITOR FILTER LOADING ACROSS EACH FILTER BANK. ALARM AT THE ECC.

6.4 PROVIDE OUTDOOR AIR AND RETURN AIR CO2 SENSORS AND MONITOR AT THE ECC.

GENERAL NOTES:

1. REFER TO DRAWINGS MH804 THROUGH MH806 FOR LOCATION OF NEW STATIC PRESSURE SENSORS IN SUPPLY DUCTWORK. WHERE MORE THAN ONE SPS IS INDICATED, THE MEASURED VALUES SHALL BE AVERAGED TO CONTROL SUPPLY AIR VOLUME.

1 REFERENCE CONTROLS DIAGRAM - EXISTING 1S-AC-8, 1S-EF-8, 1S-AC-10, 1S-EF-10

NTS

SEQUENCE OF OPERATION FOR AIR HANDLING UNITS FOR PACU (1S-AC-8) AND PRE-OP (1S-AC-10)

1. GENERAL

1.1 UNIT (AC-8, AC-10, EF-8, EF-10) IS NORMALLY STARTED AND STOPPED REMOTELY VIA THE BAS (BUILDING AUTOMATION SYSTEM). THE UNIT WILL NORMALLY OPERATE 24 HOURS/DAY WITH OCCUPIED, UNOCCUPIED, AND WARM-UP MODES. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. EXISTING SEQUENCES OF OPERATION ARE TO REMAIN IN EFFECT, BUT SHALL BE CAREFULLY COORDINATED, AUGMENTED, AND/OR REVISED AS NECESSARY TO ALLOW EXISTING UNITS TO SERVE THE NEWLY ASSIGNED AREAS AS INTENDED BY THE CURRENT PROJECT AS INDICATED BY PHASE DEMO/NEW WORK PLANS, EQUIPMENT SCHEDULES, DETAILS, AIRFLOW DIAGRAMS, CONTROL DIAGRAMS/SEQUENCES, AHU ZONING/PRESSURIZATION PLAN AND SPECS.

1.2 UNIT REPRESENTS RECENLTY UPGRADED/EXISTING EQUIPMENT TO BE REUSED/RE-ASSIGNED TO SERVICE AREAS AS INDICATED BY PLANS. COORDINATE UNIT OPERATION WITH TAB CONTRACTOR FOR ALL PROJECT PHASES AND THE REQUIRED AIRFLOW VALUES FOR DEMOLITION AND NEW WORK PHASES BASED UPON PROJECT AIRFLOW QUANTITIES INDICATED ON PLANS FOR EACH DIFFUSER, REGISTER AND GRILLE CONNECTED TO THE EQUIPMENT DISTRIBUTION SYSTEM. INTENT IS FOR AREAS AROUND ACTIVE CONSTRUCTION ZONES TO REMAIN POSITIVE WITH RESPECT TO NEGATIVE/DIRTY WORK AREAS AT ALL TIMES. REFER TO ARCHITECTURAL ICRA BOUNDARY DRAWINGS, ICRA SPECIFICATIONS AND COORDINATE WITH TAB CONTRACTOR TO ADJUST SYSTEM AND SPACE AIRFLOW QUANTITIES TO ACHIEVE THIS GOAL WHILE STILL MAINTAINING SPACE COMFORT/TEMPERATURE AND HUMIDITY CONTROLS AS IN ACCORDANCE WITH PRE-CONSTRUCTION CONDITIONS/PRE-CONSTRUCTION TAB REPORTS/TESTING.

2. UPDATED COOLING COIL CONTROL (WITH DEHUMID/ENTHALPY CONTROL & SA TEMP. RESET)

2.1 THE BAS SHALL CALCULATE, DISPLAY, AND CONTINUOUSLY UPDATE THE SUPPLY AIR DEW POINT TEMPERATURE.

2.2 THE BAS SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

2.3 THE SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON THE SYSTEM REHEAT COIL VALVE POSITIONS. THE BAS SHALL DETERMINE THE MOST CLOSED REHEAT COIL CONTROL VALVE IN THE SYSTEM. IF THE VALVE IS LESS THAN 5% OPEN (ADJ), THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE SET POINT DOWNWARD IN 0.1° F INCREMENTS TO THE MINIMUM SET POINT. IF THE MOST CLOSED REHEAT COIL VALVE IS OPEN GREATER THAN 15% (ADJ), THE BAS SHALL RESET THE SUPPLY AIR SET POINT UPWARD IN 0.1° F INCREMENTS TO THE MAXIMUM SET POINT OF 65 DEG F (ADJ./VERIFY WITH VAMC).

2.4 IF THE DISCHARGE AIR DEW POINT TEMPERATURE EXCEEDS ITS SET POINT (50.6 DEG F – ADJUSTABLE), THE BAS SHALL PROVE HUMIDIFICATION ADDITION IS NOT ACTIVE/HUMIDIFIER BLOCKING AND CONTROL VALVES ARE CLOSED. BAS SHALL THEN OVER-RIDE THE SUPPLY AIR DISCHARGE TEMPERATURE CONTROL AND MODULATE THE COOLING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE DEW POINT TEMPERATURE SET POINT. SHOULD THE CHILLED WATER PLANT/CHILLERS/CHILLED WATER DISTRIBUTION PUMPS BE ON SEASONAL SHUT-DOWN AS PROVEN WITHIN THE BAS AND NO CHILLED WATER FLOW AVAILABLE TO ALLOW DISCHARGE ENTHALPY CONTROL, BAS SHALL ALARM THAT AHU DISCHARGE AIR ENTHALPY HAS EXCEEDED SETPOINT. VAMC TO REVIEW IF EMERGENCY POWER CHILLED WATER SEQUENCE TO BE ENGAGED TO ALLOW DEHUMIDIFICATION OF SUPPLY DISCHARGE AIR DURING PERIODS WHEN SITE CHILLED WATER PLANT HAS BEEN SHUTDOWN.

2.5 THE BAS SHALL NOT PERMIT SIMULTANEOUS AHU HEATING/COOLING OPERATION OR SIMULTANEOUS AHU HUMIDIFICATION/DEHUMIDIFICATION OPERATION.

3. LOSS OF NORMAL POWER/BAS-INDEXED SHUTDOWN AND AUTOMATIC RESTART

3.1 UPON A LOSS OF NORMAL POWER, THE AHU AND ALL ASSOCIATED HVAC COMPONENTS WITHIN THE EXISTING MECHANICAL EQUIPMENT ROOM/PACU AND PRE-OP AREAS SHALL CONTINUE TO OPERATE AS PER THE SEQUENCES HEREIN. SINCE THE EMERGENCY CHILLED WATER SYSTEM IS SHARED BY MULTIPLE AHU'S (AC-16/NEW OR'S, AC-8/PACU AND AC-10/PRE-OP), THE COOLING/DEHUMIDICATION SUPPLY AIR

3.1 (CONT.) TEMPERATURE AND ENTHALPY CONTROL SEQUENCES FOR THE NEW SURGERY/OR AHU (AC-16) SHALL BE PRIORITIZED WITHIN THE BAS SYSTEM ABOVE THE DISCHARGE AIR COOLING/ENTHALPY CONTROL OF THE EXISTING AHU'S AC-8 AND AC-10. SECOND PRIORITY SHALL BE GIVEN TO AC-8 (PACU) AND THIRD PRIORITY TO AC-10 (PRE-OP). SIMILAR PRIORITY SHALL BE PROVIDED SHOULD EMERGENCY POWER SYSTEM REQUIRE COMPLETE SHUT DOWNS OF THESE AHU'S DUE TO A POTENTIAL SHORTAGE OF EMERGENCY GENERATOR/EMERGENCY POWER CAPACITY.

3.2 WHEN A SHUTDOWN COMMAND IS GENERATED BY THE BAS, OR AT THE LOCAL AHU CONTROL PANEL, THE AHU WILL DE-ENERGIZE. ALL OUTDOOR AIR, SMOKE AND ISOLATION DAMPERS ON THE AHU AND AT THE EXHAUST FAN/DISCHARGE LOUVER SHALL CLOSE. ALL CONTROL VALVES AT THE AHU SHALL CLOSE. AN ALARM SHALL BE GENERATED WITHIN THE BAS THAT THE AHU IS SHUTDOWN. THE AHU SHALL RESTART AUTOMATICALLY BY FOLLOWING THE NORMAL START-UP SEQUENCE WHEN A REMOTE OR LOCAL START COMMAND IS GENERATED BY THE BAS.

3.3 STARTUP OF PROJECT AREA AHU SYSTEMS SHALL BE PRIORITIZED WITHIN THE BAS AS FOLLOWS: AC-16/RF-16, AC-8/EF-8, AC-10/EF-10, EF-15, EF-20.

4. UNOCCUPIED MODE OVERRIDE – TEMPORARY OCCUPIED MODE

4.1 COORDINATE UNOCCUPIED MODE SCHEDULE AND DURATIONS BASED UPON FINAL VAMC-APPROVED TIME OF DAY, DAY OF THE YEAR SCHEDULE AND BUILDING/SURGICAL SUITE OCCUPANCY.

4.2 HVAC SYSTEM SHALL BE CAPABLE OF BEING INDEXED TO OCCUPIED MODE TEMPORARILY FOR AN ADJUSTABLE PERIOD OF TIME (1 HOUR INITIAL TIME FRAME – VAMC TO CONFIRM) AS INITIATED BY A LOCAL, SECURED, UNOCCUPIED OVERRIDE PUSH BUTTON LOCATED AT THE MAIN SURGICAL SUITE NURSE STATION/CONTROL 3B-159. ACCESS TO ENCLOSURE HOUSING THE PUSH BUTTON SHALL BE VIA KEY AND SHALL BE BY AUTHORIZED AND APPROVED VAMC PERSONNEL ONLY (EXAMPLES OF PERSONNEL INCLUDE VAMC NURSING/SURGICAL STAFF, VAMC FACILITIES ENGINEERS, VAMC SECURITY/CLEANING STAFF, ETC.). REFER TO DRAWING M7.00 FOR LOCATION OF UNOCCUPIED OVERRIDE PUSH BUTTON LOCATIONS FOR EACH NEW/EXISTING AHU SYSTEM SERVING THE RENOVATED AREAS (AC-16, AC-8, AC-10, AC-9).

GENERAL SHEET NOTES:

1. SEE DWG. M0.01, M0.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE. BAS CONTROLS CONTRACTOR TO COORDINATE WITH ALL TRADES, TAB CONTRACTOR AND VAMC COMMISSIONING AGENT.
3. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP OPERATIONAL MODES. REVIEW AND CONFIRM ALL NEW AND EXISTING HVAC EQUIPMENT, (AC-8/EF-8, AC-9/RF-9, AC-10/EF-10, EF-16, EF-19, AND EF-20) AND CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED HEREIN. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING OUTDOOR AIR, SUPPLY, RETURN AND EXHAUST AIRFLOW MEASUREMENT AND OFFSET CONTROL VALUES FROM TOTAL SUPPLY AIRFLOW QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED. EXISTING SEQUENCES AS DESIGNED BY OTHERS DURING THE RECENT AIR HANDLING UNIT REPLACEMENT PROJECT (VAMC PROJECT #R581-08-113) ARE SHOWN ABOVE FOR INFORMATION PURPOSES. EXISTING SEQUENCES OF OPERATION ARE TO REMAIN FOR AC-8/EF-8/AC-10/EF-10/AC-9/RF-9 WITH THE EXCEPTION OF THE ADDITIONAL SEQUENCE REQUIREMENTS/MODIFICATIONS INDICATED ON THIS DRAWING/ABOVE.
4. BAS CONTRACTOR SHALL VERIFY AND DOCUMENT LOCATION OF ALL EXISTING TO REMAIN/RE-USED/RE-CALIBRATED SENSORS PRIOR TO BEGINNING OF PROJECT/DEMOLITION EFFORTS. REVIEW CONDITION OF THESE SENSING DEVICES AND SALVAGE/REUSE/RECALIBRATE IF POSSIBLE, OTHERWISE REPLACE FOR NEW CONSTRUCTION AS REQUIRED. COORDINATE MOUNTING AND LOCATION OF ALL SENSORS WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC AS REQUIRED. RELOCATE SENSORS AS REQUIRED FOR ALL TEMPORARY AND FINAL HVAC SYSTEM OPERATION. IDENTIFY LOCATIONS (TEMPORARY AND FINAL) ON PLANS/CONTROLS SUBMITTAL FOR VAMC RECORD DOCUMENTS/KNOWLEDGE AND INCLUDE WITH O&M SUBMISSION FOR CONTROLS AND SEQUENCES OF OPERATION.
5. COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF ALL SPACE OCCUPANCY SENSORS AND THE DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN INDIVIDUALS SPACES AND/OR THE ENTIRE SUITE IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY. STERILE SURGICAL SUITE SMOKE PURGE MODE IMPACTS AC-8/EF-8 AIR TERMINAL UNITS SERVING SPACES IN SURG SUITE – SEE EQUIP. SCHEDULES AND SEQUENCES.
6. COORDINATE FINAL LOCATIONS OF SPACE REFERENCE PRESSURE SENSORS, PRESSURE MONITORS, PRESSURIZATION ALARM OVERRIDE KEY-SWTICHES, ROOM THERMOSTATS/TEMPERATURE SENSORS, HUMIDITY SENSORS, OCCUPANCY SENSORS, UNOCCUPIED OVERRIDE PUSH BOUTTONS AND OTHER WALL-MOUNTED CONTROLS DEVICES AS PER PLAN DRAWINGS, SPECIFICATIONS AND VAMC SITE ENGINEERING PERSONNEL REVIEW.
7. REFER TO ELECTRICAL PLANS AND COORDINATE POWER SOURCE FOR NEW HVAC EQUIPMENT AND FOR ALL BAS CONTROLS / CONTROL PANEL(S) AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR BAS CONTROL AND BAS TO REMAIN OPERATIONAL WHILE HVAC SYSTEMS AND EQUIPMENT ON EMERGENCY POWER REMAIN OPERATIONAL AND WHILE HVAC SYSTEMS AND EQUIPMENT ON NORMAL POWER SHUTDOWN. FOR EXAMPLE, EXISTING AIR HANDLING UNITS, AC-8/AC-10 AND EXHAUST FANS, EF-8/EF-10/EF-16 HAVE BEEN POWERED FROM EMERGENCY POWER SOURCE. THEREFORE, AIR FLOW CONTROL VALVES/AIR TERMINAL UNITS, HYDRONIC CONTROL VALVES AND ASSOCIATED BAS CONTROLS/CONTROL PANELS SHALL ALSO BE POWERED BY EMERGENCY POWER. HVAC EQUIPMENT SHALL RE-START AUTOMATICALLY DURING TRANSITION BACK TO NORMAL POWER. COORDINATE FINAL HVAC EQUIPMENT RESTART SEQUENCE/PRIORTIZATION WITH VAMC SITE ENGINEERING PERSONNEL.
8. REFER TO DETAIL SHEETS, AIRFLOW DIAGRAMS AND ALL CONTROL DIAGRAMS FOR ADDITIONAL CONTROLS REQUIREMENTS ASSOCIATED WITH AC-10 NEW FINAL-FILTER, AIRFLOW CONTROL VALVES/AIR TERMINAL UNITS, HOT WATER REHEAT COILS, ETC.

2 REFERENCE CONTROLS DIAGRAM - EXISTING 1S-AC-9, 1S-RF-9

NTS

SEQUENCE OF OPERATION FOR AIR HANDLING UNITS FOR SURGICAL SUPPORT/ADMIN/CIRCULATION AREAS (1S-AC-9)

1. GENERAL

1.1 UNIT (AC-9, RF-9) IS NORMALLY STARTED AND STOPPED REMOTELY VIA THE BAS (BUILDING AUTOMATION SYSTEM). THE UNIT WILL NORMALLY OPERATE 24 HOURS/DAY WITH OCCUPIED, UNOCCUPIED, AND WARM-UP MODES. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. EXISTING SEQUENCES OF OPERATION ARE TO REMAIN IN EFFECT, BUT SHALL BE CAREFULLY COORDINATED, AUGMENTED, AND/OR REVISED AS NECESSARY TO ALLOW EXISTING UNITS TO SERVE THE NEWLY ASSIGNED AREAS AS INTENDED BY THE CURRENT PROJECT AS INDICATED BY PHASE DEMO/NEW WORK PLANS, EQUIPMENT SCHEDULES, DETAILS, AIRFLOW DIAGRAMS, CONTROL DIAGRAMS/SEQUENCES, AHU ZONING/PRESSURIZATION PLAN AND SPECS.

1.2 UNIT REPRESENTS RECENLTY UPGRADED/EXISTING EQUIPMENT TO BE REUSED/RE-ASSIGNED TO SERVICE AREAS AS INDICATED BY PLANS. COORDINATE UNIT OPERATION WITH TAB CONTRACTOR FOR ALL PROJECT PHASES AND THE REQUIRED AIRFLOW VALUES FOR DEMOLITION AND NEW WORK PHASES BASED UPON PROJECT AIRFLOW QUANTITIES INDICATED ON PLANS FOR EACH DIFFUSER, REGISTER AND GRILLE CONNECTED TO THE EQUIPMENT DISTRIBUTION SYSTEM. INTENT IS FOR AREAS AROUND ACTIVE CONSTRUCTION ZONES TO REMAIN POSITIVE WITH RESPECT TO NEGATIVE/DIRTY WORK AREAS AT ALL TIMES. REFER TO ARCHITECTURAL ICRA BOUNDARY DRAWINGS, ICRA SPECIFICATIONS AND COORDINATE WITH TAB CONTRACTOR TO ADJUST SYSTEM AND SPACE AIRFLOW QUANTITIES TO ACHIEVE THIS GOAL WHILE STILL MAINTAINING SPACE COMFORT/TEMPERATURE AND HUMIDITY CONTROLS AS IN ACCORDANCE WITH PRE-CONSTRUCTION CONDITIONS/PRE-CONSTRUCTION TAB REPORTS/TESTING.

2. UPDATED COOLING COIL CTRL (WITH DEHUMID/ENTHALPY CONTROL & SA TEMP. RESET)

2.1 THE BAS SHALL CALCULATE, DISPLAY, AND CONTINUOUSLY UPDATE THE SUPPLY AIR DEW POINT TEMPERATURE.

2.2 THE BAS SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

2.3 THE SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON THE SYSTEM REHEAT COIL VALVE POSITIONS. THE BAS SHALL DETERMINE THE MOST CLOSED REHEAT COIL CONTROL VALVE IN THE SYSTEM. IF THE VALVE IS LESS THAN 5% OPEN (ADJ), THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE SET POINT DOWNWARD IN 0.1° F INCREMENTS TO THE MINIMUM SET POINT. IF THE MOST CLOSED REHEAT COIL VALVE IS OPEN GREATER THAN 15% (ADJ), THE BAS SHALL RESET THE SUPPLY AIR SET POINT UPWARD IN 0.1° F INCREMENTS TO THE MAXIMUM SET POINT OF 65 DEG F (ADJ./VERIFY WITH VAMC).

2.4 IF THE DISCHARGE AIR DEW POINT TEMPERATURE EXCEEDS ITS SET POINT (50.6 DEG F – ADJUSTABLE), THE BAS SHALL PROVE HUMIDIFICATION ADDITION IS NOT ACTIVE/HUMIDIFIER BLOCKING AND CONTROL VALVES ARE CLOSED. BAS SHALL THEN OVER-RIDE THE SUPPLY AIR DISCHARGE TEMPERATURE CONTROL AND MODULATE THE COOLING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE DEW POINT TEMPERATURE SET POINT. SHOULD THE CHILLED WATER PLANT/CHILLERS/CHILLED WATER DISTRIBUTION PUMPS BE ON SEASONAL SHUT-DOWN AS PROVEN WITHIN THE BAS AND NO CHILLED WATER FLOW AVAILABLE TO ALLOW DISCHARGE ENTHALPY CONTROL, BAS SHALL ALARM THAT AHU DISCHARGE AIR ENTHALPY HAS EXCEEDED SETPOINT. VAMC TO REVIEW IF EMERGENCY POWER CHILLED WATER SEQUENCE TO BE ENGAGED TO ALLOW DEHUMIDIFICATION OF SUPPLY DISCHARGE AIR DURING PERIODS WHEN SITE CHILLED WATER PLANT HAS BEEN SHUTDOWN.

2.5 THE BAS SHALL NOT PERMIT SIMULTANEOUS AHU HEATING/COOLING OPERATION OR SIMULTANEOUS AHU HUMIDIFICATION/DEHUMIDIFICATION OPERATION.

3. LOSS OF NORMAL POWER/BAS-INDEXED SHUTDOWN AND AUTOMATIC RESTART

3.1 UPON A LOSS OF NORMAL POWER, THE AHU AND ALL ASSOCIATED HVAC COMPONENTS WITHIN THE EXISTING SECOND AND THIRD FLOOR MECHANICAL EQUIPMENT ROOMS/SURGICAL SUPPORT AND ADMIN AREAS ON THE THIRD FLOOR SHALL BE SHUT-DOWN. BAS CONTROLLERS SHALL BE CONNECTED TO EMERGENCY POWER AND INDEX TO BE PREPARED TO RESTART SYSTEMS ONCE NORMAL POWER IS RESTORED. EQUIPMENT SHALL RESTART AUTOMATICALLY WHEN POWER IS RESTORED. COORDINATE PRIORITIZATION RESTART OF AC-9/RF-9 WITH VAMC/COR.

3.2 WHEN A SHUTDOWN COMMAND IS GENERATED BY THE BAS, OR AT THE LOCAL AHU CONTROL PANEL, THE AHU WILL DE-ENERGIZE. ALL OUTDOOR AIR, SMOKE AND ISOLATION DAMPERS ON THE AHU AND AT THE EXHAUST FAN/DISCHARGE LOUVER SHALL CLOSE. ALL CONTROL VALVES AT THE AHU SHALL CLOSE. AN ALARM SHALL BE GENERATED WITHIN THE BAS THAT THE AHU IS SHUTDOWN. THE AHU SHALL RESTART AUTOMATICALLY BY FOLLOWING THE NORMAL START-UP SEQUENCE WHEN A REMOTE OR LOCAL START COMMAND IS GENERATED BY THE BAS.

3.3 STARTUP OF PROJECT AREA AHU SYSTEMS SHALL BE PRIORITIZED WITHIN THE BAS AS FOLLOWS: AC-16/RF-16, AC-8/EF-8, AC-10/EF-10, EF-15, EF-20, AC-9/RF-9, EF-19.

4. UNOCCUPIED MODE OVERRIDE – TEMPORARY OCCUPIED MODE

4.1 COORDINATE UNOCCUPIED MODE SCHEDULE AND DURATIONS BASED UPON FINAL VAMC-APPROVED TIME OF DAY, DAY OF THE YEAR SCHEDULE AND BUILDING/SURGICAL SUITE OCCUPANCY.

4.2 HVAC SYSTEM SHALL BE CAPABLE OF BEING INDEXED TO OCCUPIED MODE TEMPORARILY FOR AN ADJUSTABLE PERIOD OF TIME (1 HOUR INITIAL TIME FRAME – VAMC TO CONFIRM) AS INITIATED BY A LOCAL, SECURED, UNOCCUPIED OVERRIDE PUSH BUTTON LOCATED AT THE MAIN SURGICAL SUITE NURSE STATION/CONTROL 3B-159. ACCESS TO ENCLOSURE HOUSING THE PUSH BUTTON SHALL BE VIA KEY AND SHALL BE BY AUTHORIZED AND APPROVED VAMC PERSONNEL ONLY (EXAMPLES OF PERSONNEL INCLUDE VAMC NURSING/SURGICAL STAFF, VAMC FACILITIES ENGINEERS, VAMC SECURITY/CLEANING STAFF, ETC.). REFER TO DRAWING M7.00 FOR LOCATION OF UNOCCUPIED OVERRIDE PUSH BUTTON LOCATIONS FOR EACH NEW/EXISTING AHU SYSTEM SERVING THE RENOVATED AREAS (AC-16, AC-8, AC-10, AC-9).

5. TEMPORARY AC-9/RF-9 100% OA OPERATION – END OF PHASE 3/PHASE 4A

5.1 DESIGN INTENT AT END OF PHASE 3 IS FOR AC-9/RF-9 TO TEMPORARILY SERVE THE NEWLY RENOVATED PACU/RECOVERY SUITE COMPLETED IN PHASE 3. COORDINATE THE 100% OUTDOOR/100% RELIEF/NON-RECIRCULATING OPERATION OF AC-9/RF-9 UNTIL MECH CONTRACTOR EXTENDS AC-8/EF-8 SERVICE THROUGH THE PHASE 4A DEMOLITION WORK ZONE TO THE NEW PACU SUPPLY AND EXHAUST MANIFOLD DUCTWORK. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC/COR FOR THIS TEMPORARY OPERATING CONDITION AND THE TRANSITION OVER TO FINAL SERVICE OF PACU BY EXISTING AC-8/EF-8. RECOMMENDED TIMING OF THIS OPERATION IS DURING SHOULDER SEASONS WHEN 100% ECONOMIZER OPERATION IS COMMON AND COILS/HUMIDIFIER WITHIN AC-9 WILL SATISFY LOADS DURING 100% OA OPERATION.

100% CONSTRUCTION DOCUMENTS

FULLY SPRINKLERED

NO.	DESCRIPTION	DATE

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MECHANICAL CONTROLS REF. CONTROL DIAGRAMS AND SEQUENCE MODIFICATIONS	RENOVATE SURGICAL SERVICE & UPGRADE OPERATING ROOMS	581-13-101	Office of Construction and Facilities Management
		Building Number: 1S	
Approved: Medical Center Director	Location: HUNTINGTON, WV	Drawing Number: M8.05	Department of Veterans Affairs
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